

# *R E V I E W*

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**Is the Banking Industry in Decline?  
Recent Trends and Future Prospects from  
a Historical Perspective**

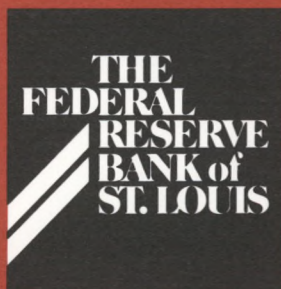
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**Indicators of Monetary Policy: The View  
from Implicit Feedback Rules**

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**The Vulnerability of Pegged Exchange  
Rates: The British Pound in the ERM**

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### **Is the Banking Industry in Decline? Recent Trends and Future Prospects from a Historical Perspective**

*David C. Wheelock*

Although commercial banks enjoyed record profits during the past two years, many observers contend that the banking industry is facing long-term decline. Many traditional banking functions are increasingly performed by specialty financial service firms and markets. Banks have responded to increased competition and technological change by offering new services themselves, and they continue to enjoy a unique role in the payments system. But, because they are heavily regulated, banks' ability to adapt to a changing, competitive environment is limited.

David C. Wheelock examines the apparently declining role of commercial banks and addresses two major policy changes that many observers believe are needed for banks to remain prominent providers of financial services: 1) removal of limits on branch banking and 2) relaxation of restrictions on services that banks may offer. Wheelock describes the growth of branch banking in the United States during the 20th century and discusses how, by hampering diversification, restrictions on interstate branching may have contributed to the high number of bank failures of recent years. He then summarizes research on the security activities of commercial banks before they were largely prohibited by the Banking Act of 1933. This survey shows that, contrary to conventional wisdom, commercial bank involvement with securities did not lead to widespread abuses or to increased risk of bank failure.

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### **Indicators of Monetary Policy: The View from Implicit Feedback Rules**

*Michael J. Dueker*

Monetary policymakers rely on a number of indicators to gauge the thrust of recent policy actions, that is, whether or not those actions have been consistent with eventual accelerations or decelerations of inflation. Unfortunately, traditional monetary policy indicators have provided conflicting signals since 1990, making it difficult to infer a target rate of inflation.

Michael J. Dueker generates several alternative indicators of monetary policy by assuming that the Federal Reserve implicitly targets either nominal gross domestic product (GDP) or M2 via a feedback rule. He finds that one of five nominal GDP targeting models examined is reliable, and it suggests that the Fed's long-run inflation target was about 3 percent between 1983 and 1990. Furthermore, the long-run inflation target does not appear to have changed in any obvious way since 1990.

## The Vulnerability of Pegged Exchange Rates: The British Pound in the ERM

**Mathias Zurlinden**

Between September 1992 and August 1993, the European Monetary System (EMS) endured its most serious crisis since it began in 1979. Cross-pegging their exchange rates in the framework of the Exchange Rate Mechanism (ERM), member countries were confronted with a string of speculative currency attacks. As described by Mathias Zurlinden, the near-collapse of the ERM provides a useful example of a speculative attack under conditions of easy access to foreign exchange reserves and free capital mobility. Concentrating on the British experience in the ERM during the crisis, Zurlinden finds that a necessary condition for a speculative attack is the markets' expectation that the central bank will shift policy as a result of the attack. He concludes that an unwavering commitment to a fixed exchange rate is critical to maintaining an effective exchange regime.

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**David C. Wheelock**

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# ***Is the Banking Industry in Decline? Recent Trends and Future Prospects from a Historical Perspective***

*"Banking is essential to a modern economy. Banks are not."*  
—Edward Furash (1993)

**C**OMMERCIAL BANKS ENJOYED record profits in 1992 and during the first half of 1993. Many observers believe the industry's future may be far less bright, however, if banks continue to lose market share to other intermediaries and providers of transaction services. Some policy makers, including Federal Reserve Board Chairman Alan Greenspan and Comptroller of the Currency Eugene A. Ludwig, have questioned whether banks will be able to maintain their role as providers of financial services in the future without significant changes in regulation.<sup>1</sup>

A shrinking banking industry may reflect a reallocation of resources toward more efficient uses, and, hence, should not necessarily be viewed as undesirable. But, because banks are heavily regulated, policy makers need to consider whether their policies are either hastening or interfering with changes in the size and structure

of the industry. Such changes may impose significant social costs, since commercial banks are at the heart of the payments system and continue to be important sources of credit for small firms and other borrowers. Furthermore, changes in the size or importance of the banking industry might also affect the ability of the Federal Reserve to implement monetary policy, since monetary policy is conducted primarily by altering commercial bank reserve balances.<sup>2</sup>

The banking industry has been on a roller coaster ride since 1980. From World War II through the 1970s, banks generally had stable earnings and no more than 10 bank failures occurred in any year. The banks that did fail were usually tiny and largely unnoticed. The number of failures rose sharply in the 1980s, reaching 206 in 1989. Although the number of failures has since declined and bank profits have

<sup>1</sup>Greenspan (1993); Ludwig's remarks before the Merrill Lynch Financial Services Conference are reported in Bureau of National Affairs (1993).

<sup>2</sup>Duca (1993) investigates the impact of a diminishing role for banks on monetary aggregates and the implications for Federal Reserve control of the money supply.



recently been high, the size and structure of the industry have continued to change dramatically.

The upheaval of the past 10 years and uncertain outlook for the industry's future make this an appropriate time to put recent changes in the size of the banking industry in a longer-term perspective. This article first examines the apparently diminishing role of commercial banks as intermediaries and providers of transaction services. Commercial bank shares of U.S. financial assets, commercial lending and transaction accounts have fallen in recent years, which some observers believe reflects an industry in long-term decline. Others, however, argue that banks will remain central to the payments system and important lenders for large classes of borrowers, and note that banks are generating an increasing amount of their income from "off-balance-sheet" activities. This article presents some evidence on both sides of the debate and addresses two major policy changes that many observers believe are needed for banks to remain prominent providers of financial services in the future: 1) removal of limits on branch banking and 2) relaxation of restrictions on the services that banks may offer.

## IS THE ROLE OF COMMERCIAL BANKS DECLINING?

Commercial banks specialize in the evaluation of credit risks and monitoring of borrowers, as well as clearing transactions. Traditionally, they have been important sources of loans for firms, households and even governments. In addition, banks are integral to the payments system, issuing most of the nation's transaction deposits and clearing domestic and international payments. As of December 31, 1992, the 11,461 U.S. commercial banks and trust companies whose deposits are insured by the FDIC held \$3,506

billion of assets, \$2,699 billion of deposits and employed 1,477,827 people.<sup>3</sup>

Although commercial banks remain the largest single class of financial institutions in terms of assets, banks have lost market share to other intermediaries and providers of transaction services.<sup>4</sup> Dramatic improvements in communications and computer technology have reduced the cost of performing information-intensive activities, and thereby permitted growing roles for firms and markets that provide specialized financial services. They have also subjected American banks to increased competition from foreign lenders, as have reductions in government barriers to the flow of goods and capital between countries.<sup>5</sup>

Figures 1 and 2 illustrate the declining market share of banks as intermediaries. Figure 1 shows that commercial banks' share of financial assets held by all financial institutions has fallen since the early 1970s. Indeed, the trend has been downward since World War II. Commercial bank loans as a share of the short-term debt of nonfinancial corporations has similarly declined, as figure 2 illustrates.<sup>6</sup>

One rapidly growing source of funds for large corporations is the commercial paper market, which has expanded rapidly since the 1960s. Many corporations, especially established firms with good credit histories, have discovered that they can acquire short-term funds less expensively by issuing commercial paper than by borrowing from banks. Figure 3 shows that the ratio of commercial paper outstanding issued by nonfinancial corporations to the commercial and industrial (C&I) loans of banks has risen markedly since 1980.<sup>7</sup>

While facing new competition for borrowers from the commercial paper market and from nonbank lenders, banks have also faced greater competition for funds. In the 1960s, the expand-

<sup>3</sup>Federal Deposit Insurance Corporation (1992).

<sup>4</sup>At the end of 1992, U.S. commercial banks had total financial assets of \$2,774.6 billion, while thrift institutions had \$1,345.3 billion, life insurance companies had \$1,622.8 billion, other insurance companies had \$624.4 billion, private pension funds had \$2,349.4 billion, state and local government employee retirement funds had \$972.3 billion, finance companies had \$807.1 billion, mutual funds had \$1,050.2 billion and money market mutual funds had \$543.6 billion. The source of these data is the Board of Governors of the Federal Reserve System's *Flow of Funds*.

<sup>5</sup>See Edwards (1993, pp. 9-11), Barth, Brumbaugh and Litan (1992, pp. 59-64) and Kaufman (1991) for further discussion of the sources of increased competition for commercial

banks. Aguilar (1990) documents the growth during the 1980s of bank services provided by nonbank firms.

<sup>6</sup>At the end of 1992, nonbank private financial institutions had total financial assets of \$10,012.0 billion. Commercial bank loans to nonfinancial corporations totaled \$518.5 billion, while the sum of loans and other short-term paper of nonfinancial corporations was \$888.0 billion. The source of these data is Board of Governors of the Federal Reserve System, *Flow of Funds*.

<sup>7</sup>At the end of 1992, C&I loans totaled \$597.6 billion and outstanding commercial paper of nonfinancial corporations was \$107.1 billion (Board of Governors of the Federal Reserve System, *Flow of Funds*). Hahn (1993) provides a description of the commercial paper market.



Figure 1  
**Commercial Banking Industry Share of U.S. Financial Assets**

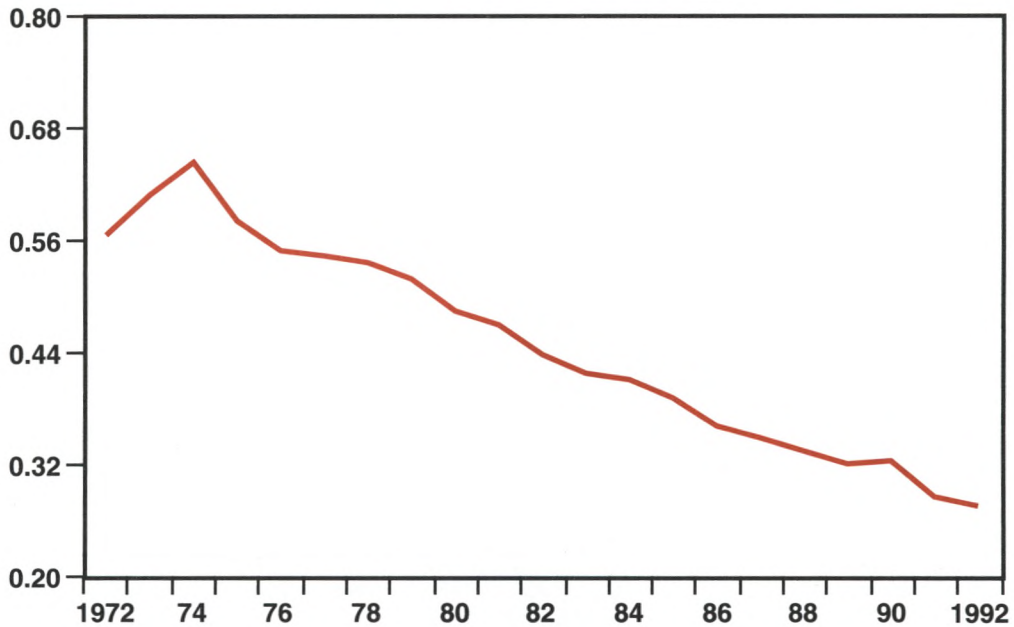


Figure 2  
**Commercial Bank Loan Share of All Short-Term Debt of Nonfinancial Corporations**

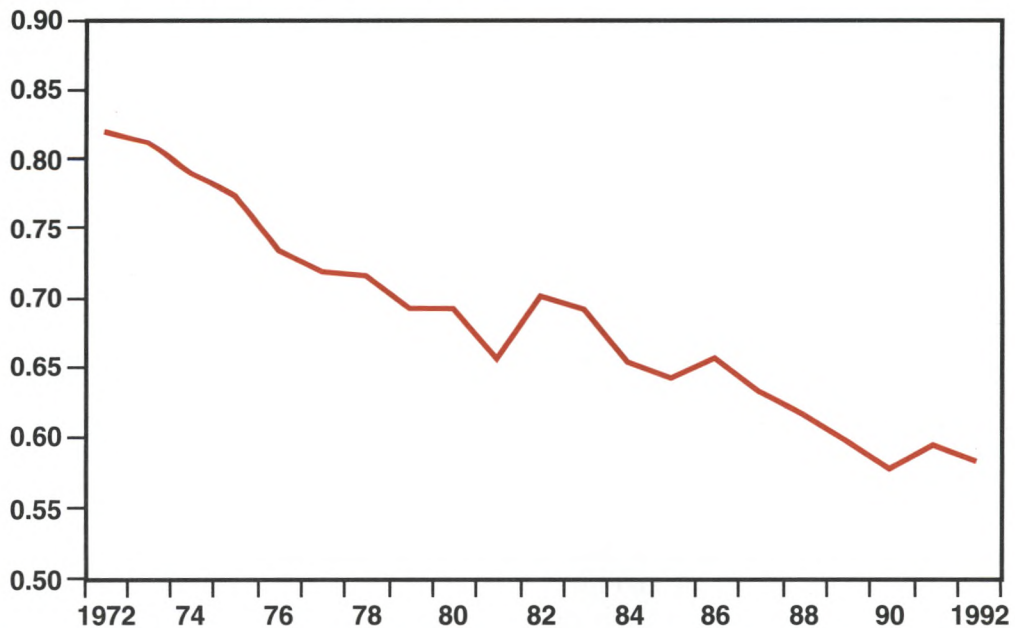
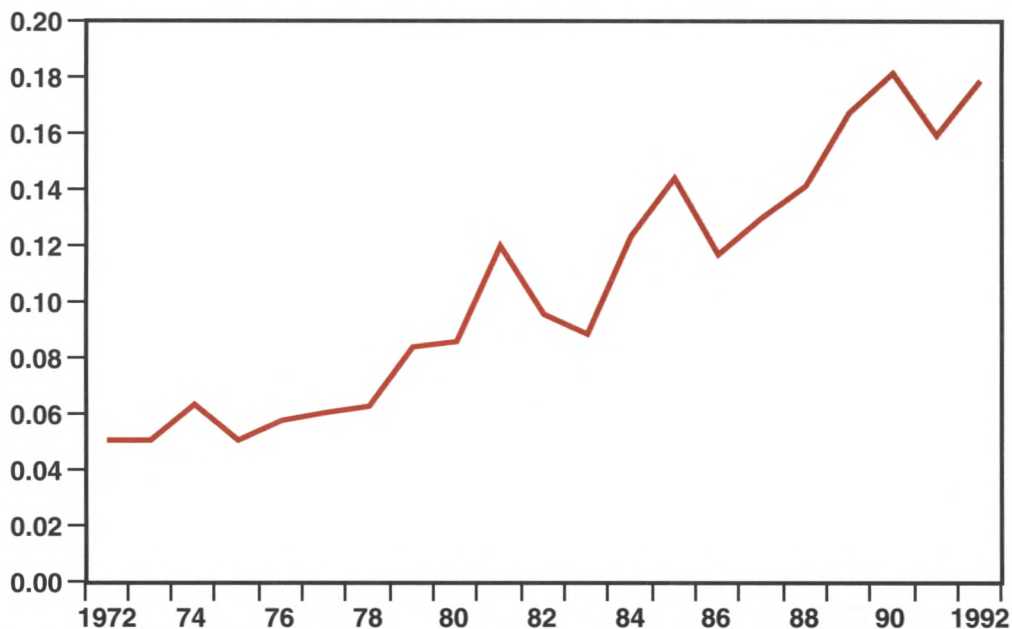




Figure 3  
**Ratio of Commercial Paper of Nonfinancial Corporations to Commercial Bank C & I Loans**



ing money market offered corporations and wealthy individuals new alternatives to bank deposits. Inflation and rising interest rates caused extensive deposit outflows from banks because the rates that banks were permitted to pay depositors were limited by interest rate ceilings. Banks responded by introducing negotiable certificates of deposit, which were not subject to rate ceilings. Many banks also adopted the one-bank holding company organizational form to acquire funds from the money market by issuing debt instruments through the holding company. Still, commercial banks were unable to maintain their share of the market for financial assets.

The money market mutual fund was perhaps the most important financial innovation affecting the ability of banks to compete for deposits. Introduced in the 1970s, money market mutual funds offer small depositors the opportunity to hold highly liquid accounts yielding market interest rates. Although uninsured and with minimum transaction amounts, money market mutual funds grew rapidly in the 1970s and early 1980s as reserve requirements and interest rate ceilings left banks competitively disadvantaged. Commercial banks also lost their monopoly on the issuance of insured transaction

accounts when thrifts and credit unions began offering share accounts, often on more favorable terms than banks were permitted to provide. Deregulation of deposit interest rates in the 1980s enabled commercial banks to compete for funds, but did not reverse the declines in bank market shares for transaction accounts. Access to the payments system remains almost exclusively the domain of commercial banks; mutual funds, thrifts and other financial institutions issuing transaction accounts must ultimately rely on banks to make payments. Nonetheless, increased competition for transaction account customers helps explain why the banking industry's share of aggregate financial assets has fallen.

Increased competition for traditional bank services affecting both the asset and the liability sides of bank balance sheets has caused numerous observers to be pessimistic about the future of the banking industry. Edwards (1993) goes so far as to argue that "if our financial markets and institutions were being created for the first time in 1990, banks might not be among the surviving institutions." Others, such as Barth, Brumbaugh and Litan (1992), Gorton and Rosen (1992) and Kaufman (1991) contend that government policies that restrict the geographic location and services that banks can provide and impose



regulations (such as minimum capital and reserve requirements and community investment mandates) that are not placed on other intermediaries hamper the ability of banks to compete. These researchers argue that the banking industry is destined to decline substantially in the future without significant regulatory changes.

Other researchers are more sanguine about the banking industry's future. Boyd and Gertler (1993), for example, argue that much of the increased risk-taking by banks and their subsequent poor performance during the 1980s can be attributed to the failure-resolution policy known as "too-big-to-fail." To reduce the possibility that the failure of a very large bank could lead to a systemic crisis, with depositor runs on many banks, regulators adopted a policy that tended to protect all of the depositors and often other creditors of large banks that failed. In contrast, uninsured depositors of small banks that failed were less frequently protected from loss, and the assets of such institutions were more often liquidated.

Although the "too-big-to-fail" policy was implemented to limit the repercussions stemming from the failure of very large banks, Boyd and Gertler (1993) contend that the policy encouraged large banks to assume greater risks than they would have otherwise. The consequence was that banks with more than \$10 billion in assets had the lowest average profit rate during 1983–91 of any size class, regardless of location. Boyd and Gertler thus applaud recent increases in bank capital requirements and restrictions on the use of the "too-big-to-fail" closure policy imposed by the Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA), because both changes should limit the incentive for large banks to take excessive risks.<sup>8</sup>

Boyd and Gertler point out that many banks are now generating substantial earnings from non-traditional, or off-balance-sheet, sources. The unique position of banks in the payments system and their access to the federal lender of last resort enhances the role of banks in providing services to nonbank lenders and financial

markets. Ironically, banks have played a significant role in the development of new financial markets and services that compete in traditional bank niches. For example, bank loan guarantees to issuers of commercial paper have spurred the growth of the commercial paper market. Because many such lines of credit are provided to back finance company issues of commercial paper, the decline of bank loans relative to commercial paper issues overstates the decline of the commercial banking industry's role in intermediation.<sup>9</sup>

Other off-balance-sheet activities that provide income for banks include loan sales, loan servicing, mutual fund sales and participation in the markets for derivative securities, such as options and swaps.<sup>10</sup> Many banks originate and then sell loans to third parties before they come due. Often home mortgages or other common loan types are bundled and sold in secondary markets, a practice known as securitization. The fee income that banks generate from issuing letters of credit, providing loan commitments, securitization and dealing in foreign exchange and derivative securities has increased more rapidly in the last decade than interest income, as figure 4 illustrates.

The unique position of banks in the payments system and their access to the Federal Reserve discount window also suggest that banks could remain important lenders in the future. By monitoring transaction accounts, or by requiring that borrower receipts and payments be processed by the bank, for example, banks can acquire useful information about current and potential borrowers. Even though specialty lenders and financial service firms, such as mutual funds, provide some intermediation services at lower cost, banks may continue to have an advantage for loans that are especially information-intensive.<sup>11</sup>

## SHOULD BANKS BE GIVEN GREATER POWERS?

Despite the advantages of access to the payments system and Federal Reserve discount win-

<sup>8</sup>Wall (1993) describes how the "too-big-to-fail" policy and the likelihood of systemic risk will likely change under FDICIA.

<sup>9</sup>Remolona and Wulfekuhler (1992) report that finance company lending shares increased the most in niches, such as lease financing, where finance companies have traditionally played a major role, which also suggests that the large gains made by finance companies during the 1980s may not signal a long-run trend.

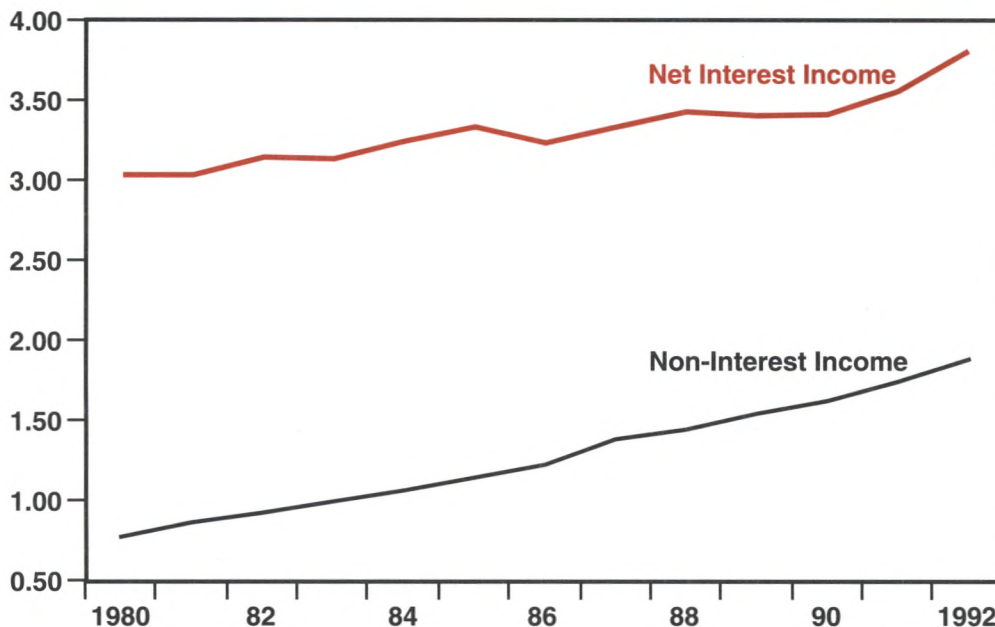
<sup>10</sup>See Napoli (1992) for a discussion of derivative securities markets.

<sup>11</sup>Using data from 1978–92, Pulley and Humphrey (1993) estimate that the economies from supplying loan and transaction services jointly are small.



## Figure 4 Banking Industry Income

Income as a percentage of assets



dow, and the substantial growth of income from off-balance-sheet activities, many observers, including Boyd and Gertler, advocate significant changes in bank regulation. Most state restrictions on branching have already been removed and regulators allow banks to sell mutual funds and offer other securities services. Interstate branching remains largely prohibited, however, as do commercial bank underwriting and ownership of most corporate securities.<sup>12</sup> In addition, banks are largely prohibited from offering a variety of related financial services, including insurance and real estate services.<sup>13</sup> Advocates for further reduction of restrictions on branching and the services that banks are permitted to offer argue that deregulation would enable banks to achieve greater diversification and, hence, reduce their chance of failure. Proponents also contend that large, diversified banks would be more efficient and provide financial services at

lower cost to the public than presently available, though critics rebuff many of these claims.

A review of all of the arguments in favor of and against expanded branching authority and deregulation of bank assets and services is beyond the scope of this article. The following sections, however, will describe the evolution of branching laws and restrictions on bank services in the United States, focusing especially on historical lessons that could inform the current debate on these issues.

### BRANCH BANKING

Unlike the United States, most countries have a small number of commercial banks, nationwide branching and virtually no bank failures. The high costs of communication and transportation may have made it difficult to operate vast branch banking networks in the United States during

<sup>12</sup>Several states have recently enacted or are considering reciprocal legislation that would permit branch offices of out-of-state banks based in states with similar laws. The privilege, however, applies only to state-chartered banks that are not members of the Federal Reserve System.

<sup>13</sup>Barth and Brumbaugh (1993) provide an up-to-date summary of commercial bank powers at both the state and national levels.



the 19th century, but today the main impediment to branching is government regulation.<sup>14</sup>

Where permitted, banks might operate branches to capture economies of scale, diversification opportunities or lower overhead costs. States that allow branch banking tend to have fewer banks (but not fewer bank offices) per capita than states that restrict branching.<sup>15</sup> A bank locates in a particular market only if there appears to be sufficient demand for it to operate at a profitable scale. Because the minimum profitable scale for a branch is smaller than for an independent bank, in the absence of branching restrictions, small markets that are served by one or two independent banks might instead be served by several branch offices.

Proponents of easing branch banking restrictions contend that branching affords banks greater opportunity to diversify and, hence, lessens their chance of failure. Banks whose assets are comprised largely of loans in a particular region could be pulled down by an adverse local economic shock, whereas a bank with loans in several regions could withstand a downturn in the economy of any one region it serves. Branching restrictions do not necessarily prevent banks from diversifying geographically. Banks sometimes purchase loans made by banks in other locations. In addition, multiple bank holding companies and limited facility branches, such as loan production offices, are often permitted where full-service branches are not, including across state lines.<sup>16</sup> Nonetheless, branching restrictions limit flexibility and increase the cost of diversification, and proponents, such as Kaufman (1993), argue that interstate branching would “permit even greater geographic and product diversification than interstate holding company banking and improve bank safety.” Similarly, Clair and O’Driscoll (1991) argue that branching restrictions explain why Texas had so many bank failures during the 1980s while the banking industry as a whole had record profits. Such arguments were also made in the 1920s, when thousands of unit

banks failed in rural farming states, even as the banking industry as a whole was profitable.<sup>17</sup>

## **Banking Before World War II**

The geographic dispersion of American banking markets and restrictions on branch banking have a long history. In the 19th century, sparsely populated states often permitted banks to operate with little capital to ensure the presence of banking facilities in rural areas. Branch banking networks could have met the demand for bank offices, but fears that branching would reduce competition and pull savings away from rural areas to urban centers made branching politically unfeasible. Calomiris (1992a) argues that agricultural landowners had an incentive to favor unit banking to ensure that local banks would continue to lend to them following an adverse local shock. Branch banking organizations, by contrast, could close offices or restrict loans to areas experiencing distress. In agricultural states, the interests of farmers thus tended to coincide with those of community bankers and state regulators to favor restrictions on branching. Consequently, reductions in minimum capital requirements were almost always the policy response to increased demand for banking facilities.<sup>18</sup>

Figure 5 plots the number of U.S. commercial banks at the end of each year since 1900, and the number of branch offices since 1920. The number of banks increased dramatically after 1900, when the Gold Standard Act halved the minimum capital requirement from \$50,000 to \$25,000 for chartering national banks in towns smaller than 3,000 persons. Many states responded by reducing minimum capital requirements for state-chartered banks to as low as \$5,000. The lowering of this barrier and generally strong economic growth encouraged the entry of many new banks. The strict limits on branching imposed by the federal government and by most states meant that new banks, rather than new branches of existing banks, largely met increases in the demand for banking services.

<sup>14</sup>Branch banking networks operated in several Southern states before the Civil War, and the First and Second Banks of the United States operated branches in several cities. Branching was not widespread, however, and in many states banks did not operate branches even where they were not prohibited.

<sup>15</sup>Evanoff (1988) found that in 1980 the number of bank offices per square mile was higher in both urban and rural areas of states permitting branching than in unit banking states. He found, however, more bank offices in states permitting limited branching than in states permitting state-wide branching.

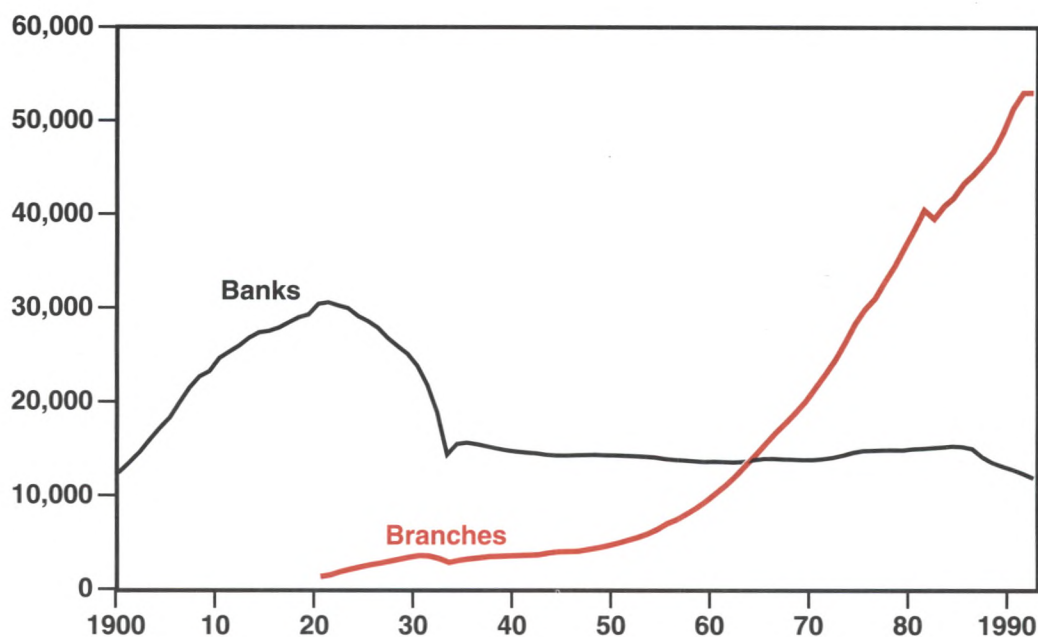
<sup>16</sup>See Hanweck (1992) for a discussion of policy issues pertaining to interstate banking.

<sup>17</sup>For example, the Comptroller of the Currency, John W. Pole, cited the widespread failures of “one-crop” and “fair-weather” banks, i.e., small, undiversified farming banks, as evidence of the need for branch banking. See his testimony in U.S. House of Representatives (1930).

<sup>18</sup>See also White (1982).



**Figure 5**  
**Number of Commercial Banks and Branches**



The rapid increase in the number of banks continued through 1920. The increase was especially large between 1914 and 1920 in agricultural states, where wartime demand for farm products, dispersed populations and strict prohibitions on branching encouraged a plethora of small unit banks. The number of banks and aggregate bank assets also grew rapidly in the eight states that adopted deposit insurance systems. Because insurance premiums were low and unrelated to the probability of failure, deposit insurance encouraged greater investment in commercial banks than would have otherwise occurred.<sup>19</sup>

In 1921, the number of commercial banks reached 30,456, an all-time peak. By then, the shock that would bring about widespread bank failures and reduce the number of banks had already occurred. The wartime increase in commodity prices reversed in mid-1920, and the All Commodities Price Index declined 36.8 percent between 1920 and 1921.<sup>20</sup> A sharp increase in

loan defaults and bank failures in agricultural states followed. Between 1921 and 1929, 5,712 banks suspended operations, including 976 banks in the peak failure year of 1926.<sup>21</sup> As in the 1980s, bank failures in the 1920s were regionally concentrated. Rural areas, especially in the Midwest and the South, suffered high failure rates while failure rates were low in urban areas, the Northeast and the West Coast.

While the number of commercial banks declined, the number of branch bank offices rose during the 1920s, from 1,281 in 1920 to 3,353 in 1929. Before 1920, many state banking laws were silent on the issue of branch banking, though administrative or judicial interpretation, or simply custom, prevented branching. By 1924, however, many state legislatures had considered the issue, with Arizona, California, Delaware, Georgia, Maryland, North Carolina, Rhode Island, South Carolina, Tennessee and Virginia permitting state-wide branching, and nine others permitting limited branching. Other states either

<sup>19</sup>Oklahoma initiated deposit insurance in 1908 and was followed by Kansas, Nebraska, South Dakota and Texas in 1909, Mississippi in 1914, and North Dakota and Washington in 1917. See Calomiris (1992b) and Wheelock (1993) for evidence that deposit insurance strongly influenced the growth of bank assets and the number of banks per capita before 1920.

<sup>20</sup>U.S. Department of Commerce (1960), series E13.

<sup>21</sup>Board of Governors of the Federal Reserve System (1943).



prohibited all branching or had no law either allowing or prohibiting branching. Where branching was permitted, only state-chartered banks that were not members of the Federal Reserve System could establish branches. The National Bank Consolidation Act of 1918, however, permitted national banks to keep branches acquired through consolidation with state-chartered banks. Later, the McFadden Act of 1927 permitted national banks to establish branches within their home-office cities in states that granted the same privilege to state-chartered banks.<sup>22</sup>

Despite increased branching, differences in branch banking laws explain little of the variation in bank failure rates across states during the 1920s. Alston, Grove and Wheelock (1993) find that a state's failure rate was determined mainly by the severity of agricultural distress it suffered, and that distress had a greater impact on failure rates in states having deposit insurance systems. Differences in the extent of branch banking and other suggested causes of failure account for comparatively little of the variation in failure rates across states. The lack of an apparent relationship between branching and performance in the 1920s probably reflects the limited extent of branching in the Midwest and the South, where the worst of the agricultural collapse was felt. Furthermore, state economies in the Midwest and the South were not sufficiently diverse to provide banks with much protection from a general collapse of commodity prices, even where statewide branching was permitted. Interstate branching, however, might have allowed sufficient diversification to limit failures. Canada, which also experienced sharp income declines in commodity-producing regions, had nationwide branch banking and just one bank failure in the 1920s.<sup>23</sup>

The Great Depression ushered in further waves of bank failures, and though initially concentrated in farming areas, failures later spread through-

out the country. From 1930 to 1933, 9,096 banks suspended operations. In 1933 alone, 4,000 banks closed, including 2,122 that closed during the Bank Holiday in March 1933 and never re-opened.<sup>24</sup> Between December 1929 and December 1933, the number of commercial banks in the United States declined 43 percent, from 24,970 to 14,207.

Major banking legislation was enacted during the Depression, beginning with the Banking Act of 1933 (also known as the Glass-Steagall Act after its principal authors). This legislation introduced federal deposit insurance, imposed limits on the interest rates that banks were permitted to pay depositors and constrained bank activities in numerous ways. Though Senator Carter Glass believed that banks should be restricted to making short-term commercial loans, he was an advocate of branch banking. On this issue he was in the minority, and except for a provision in the Banking Act of 1933 providing national banks with all branching authority granted to state-chartered banks, branching was largely ignored in banking legislation during the 1930s. The large money center banks that tended to favor liberal branching laws and authority to perform a broad array of securities services, and which opposed deposit insurance, were widely viewed as the villains that caused the Great Depression. Little wonder that New Deal banking legislation enacted deposit insurance and curbs on bank securities activities, without expanding the opportunities for branching.<sup>25</sup>

### ***Banking Since World War II***

The number of banks changed relatively little in the 50 years following passage of the Banking Act of 1933. Since 1984, however, when the number of commercial banks in the United States reached a post-World War II peak of 15,126, the number of banks has fallen 25 percent to 11,406 firms, and today there are fewer commercial banks in the United States than at any other time in the 20th century.<sup>26</sup>

<sup>22</sup>See White (1983) for further detail about branch banking in the United States during the 1920s.

<sup>23</sup>For comparison of the U.S. and Canadian experiences, see White (1983) or Bordo, Rockhoff and Redish (1993).

<sup>24</sup>Federal Reserve *Bulletin*, December 1937, p. 1208.

<sup>25</sup>Burns (1974) examines the politics involved in New Deal banking legislation.

<sup>26</sup>The shaded insert on p. 12 presents an accounting of changes in the number of banks since 1984, highlighting the contribution of Texas and discussing other changing aspects of market structure.



## Recent Changes in Bank Market Structure

The accompanying table shows the contributions made by new entrants, closures and mergers to annual changes in the number of insured commercial banks in the United States from 1980 to 1992.<sup>1</sup> The net change in the number of banks equals the number of new banks less those which ceased operations, converted to branches of other banks or consolidated. Because any of the categories could reflect the resolution of a bank failure, I also list the total number of failures in each year.<sup>2</sup> Despite rising failures, the number of insured commercial banks increased through 1984 because the number of new banks exceeded those closed, converted to branches of other banks or consolidated. After 1984, however, the number of new bank charters declined while failures continued to rise. Although failures have dropped off recently, large numbers of banks—both failed and solvent—continue to be converted to branches of other banks. Consequently, the number of commercial banks has continued to decline by several hundred banks per year since the mid-1980s.

Texas accounts for much of the recent fluctuation in the number of banks in the United States. Between 1980 and 1989, 24 percent of all new U.S. bank charters were issued in Texas, and the state accounted for over half of all new charters during 1983 and 1984.<sup>3</sup> The energy boom of the 1970s became the real estate boom of the 1980s, and Texas enjoyed several years of strong economic growth. Existing banks grew rapidly and many new banks opened. Because the state strictly limited branching prior to 1987, almost all new bank offices were either independent unit banks or members of bank holding companies.

Disinflation and declining petroleum prices eventually brought a collapse of the commercial real estate market throughout the Southwest, increasing loan defaults and commercial bank failures. Texas alone had one-third of all U.S. bank failures during the 1980s, and over half of all U.S. failures in 1988 when 175 Texas banks failed.<sup>4</sup>

Throughout the United States, many of the banks that have failed or been absorbed by other commercial banks have been small. Between 1984 and 1992, the number of banks with less than \$50 million of assets (in 1984 prices) declined by 2,525, from 9,217 to 6,692, accounting for 86 percent of the total decline in the number of insured commercial banks.<sup>5</sup> The share of total U.S. bank assets held by small banks has also declined, from 8.6 percent in 1984 to 6.3 percent in 1992, while their share of U.S. bank equity has fallen from 12.6 percent to 8.1 percent.

Accompanying the increase in branching has been a growing affiliation of banks with holding companies. Although bank holding companies have existed since the 1920s, the number of banks affiliated with holding companies has increased sharply in recent years. In 1970, 1,069 commercial banks (7.9 percent of all banks) were members of multi-bank holding companies, whereas in 1992, 3,501 banks (30.8 percent) belonged to multi-bank holding companies. Holding company banks are typically larger than other banks, and during 1970–92 the share of total commercial bank assets held by banks affiliated with multi-bank holding companies increased from 30.2 percent to 73.7 percent.<sup>6</sup>

<sup>1</sup>The sources of these data are the Board of Governors of the Federal Reserve System (1991a, 1991b, 1992, Table 72) and the Board of Governors of the Federal Reserve System (1993, Table 15).

<sup>2</sup>Failure data since 1986 reflect only banks closed because of financial difficulty and not those receiving open bank assistance. The sources of these data are Federal Deposit Insurance Corporation (1991, Table A) and Federal Deposit Insurance Corporation (1992).

<sup>3</sup>O'Keefe (1990, p. 4).

<sup>4</sup>Horvitz (1992) examines the causes of Texas bank and thrift failures.

<sup>5</sup>Because data on the number of banks by asset size are not published, these figures were computed directly from the quarterly call reports for insured commercial banks and limited to the 50 states. There were 14,348 banks in this category in 1984 and 11,406 in 1992. The asset cutoff point of \$50 million in 1984 was adjusted for inflation by the GDP (gross domestic product) deflator. In 1992 the cutoff point was \$66.275 million.

<sup>6</sup>Bank holding company data are an unpublished series from the Board of Governors of the Federal Reserve System.



Table

**Determinants of Changes in the Number of Insured Banks**

Year	New Banks	Ceased Operations	Converted to Branches	Other Consolidations	Net Change	Failures
1980	206	-3	-117	-15	71	10
1981	199	-2	-196	-21	-20	10
1982	316	-6	-247	-28	35	42
1983	366	-7	-300	-35	24	48
1984	400	-2	-345	-2	51	79
1985	318	-50	-309	-38	-79	120
1986	248	-168	-301	22	-199	138
1987	212	-207	-528	41	-482	184
1988	228	-225	-587	6	-578	200
1989	201	-242	-392	19	-414	206
1990	163	-175	-373	30	-355	168
1991	103	-126	-409	33	-399	124
1992	78	-133	-415	8	-462	120

Economists usually attribute the stability of the banking industry from the mid-1930s to 1980 to the system of deposit insurance and regulation imposed on banks, and the generally steady growth of the U.S. economy.<sup>27</sup> Deposit insurance and controls on entry to the industry made bank charters valuable, and deposit interest rate controls stabilized the largest component of bank costs. But, over time, rising inflation and higher interest rates, coupled with greater competition among banks and from non-bank intermediaries, increasingly threatened the stability of the banking system.

Rapid improvements in computer and communications technology began to seriously erode traditional bank niches in the 1960s. Nonbank sources of intermediation, such as the commercial paper market, grew rapidly in this decade, while deposit interest rate ceilings hampered the ability of banks to compete for funds against the expanding money market. The introduction of money market mutual funds and transaction accounts at thrifts in the 1970s, and ever-increasing market interest rates, led Congress to enact the Depository Institutions Deregulation and Monetary Control Act of 1980, which deregulated deposit interest rates. Though it helped banks compete for deposits, the legislation came at a time when market rates were exceptionally

high. So, banks experienced sharp increases in the cost of funds and many suffered substantial losses.

As competition from nonbank intermediaries grew, the commercial banking industry itself became increasingly competitive. In the 1960s, regulators began issuing new bank charters more freely, and many states reduced barriers to branching and interstate holding companies. As their charter values declined, banks had an incentive to increase their assets-per-dollar-of-equity and to make increasingly risky loans.<sup>28</sup> Increased competition benefited consumers of banking services, but left the banking system more vulnerable to exogenous economic shocks.

Declining agricultural income and a collapse of agricultural and energy prices in the early 1980s resulted in the insolvency of many banks during the subsequent decade. Many farmers who had borrowed to buy land in the 1970s were unable to repay their loans when incomes fell, resulting in the failure of many agricultural lenders. Similarly, the economic boom in Texas, Louisiana, Oklahoma and other energy producing states that accompanied rising energy prices in the 1970s gave way to falling incomes in the 1980s. Banks lent heavily to energy producers and later to real estate developers in these states, and profited from the fortunes of their borrow-

<sup>27</sup>Friedman and Schwartz (1963) attribute much of the decline in failures and absence of banking panics after 1933 to deposit insurance. More recently, scholars such as Keeley (1990) and Flood (1993) note the importance of regulations that encouraged banks to act conservatively and offset the incentive for excessive risk-taking created by deposit insurance.

<sup>28</sup>When deposit insurance premiums are unrelated to risk, banks have an incentive to take greater risks than they otherwise would. A decline in charter value magnifies this incentive. See Keeley (1990).



ers. When incomes realized from real estate development failed to meet expectations, borrowers defaulted on their loans and many banks became insolvent. A similar phenomenon occurred in New England in 1990–92, when a collapse of local real estate markets led to the failure of numerous commercial banks.

While the number of commercial banks remained fairly constant until the 1980s, the number of branch bank offices has increased dramatically over the entire post-World War II era. The initial surge in branches accompanied the great population migration from central cities to suburbs following the war. And, since 1970, the number of branch offices has more than doubled, from 21,424 to 53,744 in 1992, while the percentage of banks with multiple offices has increased from 29 to 57 percent. Since 1984, the total number of bank offices (banks plus branches) has increased, despite a 25 percent decline in the number of banks, because the number of branch offices has risen from 41,740 to 53,744.

In the 1920s, branch banking was too limited to prevent widespread bank failures in areas suffering sharp income declines. The high number of failures in agricultural and energy-producing states since 1980 suggests that, despite the large increase in the number of branch banks in recent years, branching may still be too limited to protect the banking system from regional or sectoral shocks. As in the 1920s, many of the states experiencing the greatest economic distress in the 1980s also had the most restrictive branching laws. Even states that permit statewide branching, such as Arizona and Connecticut, have had relatively high failure rates since 1980, suggesting again that statewide branching alone may not result in enough diversification to prevent high numbers of bank failures.

Figures 6–8 provide a rough indication of the impact of state branching laws during the 1980s. Figure 6 shows states classified according to whether they permitted statewide branching, permitted limited branching or prohibited all branching, as of December 31, 1979.<sup>29</sup> Figure 7 shows that states tended to have more banks

per 1,000 inhabitants if they limited branching, or prohibited it altogether, than if they permitted statewide branching. No such clear correlation between branching restrictions and bank failure rates is apparent, however. Figure 8 plots the average annual bank failure rate during 1980–92 for each state. Among the 48 continental states, Texas had the highest average failure rate, a relatively high number of banks per capita in 1980, and in 1980 prohibited all branching. Other states with high failure rates, however, such as Arizona, Oregon, Utah, New Hampshire, Connecticut and Massachusetts, permitted at least some branching in 1980 and had low numbers of banks per capita. Moreover, the average failure rates in some unit banking states, such as Montana, North Dakota and Illinois, were low.<sup>30</sup>

The lack of an obvious relationship between state branching laws and bank failure rates is not surprising for two reasons. First, failures will not be high unless borrowers are unable to repay their loans. In Texas, for example, real estate developers and energy producers suffered sharp income declines and defaulted on loans. There were fewer loan losses and consequently lower bank failure rates in other states, including most unit banking states. Second, statewide branching will not prevent failures if the timing and extent of economic distress is similar throughout a state. Texas banks were able to achieve a measure of geographic diversification through multi-bank holding companies, and undoubtedly statewide branching would have enabled even more diversification. The collapse of energy and real estate prices affected the entire state, however, and, thus, many banks would likely have failed even if statewide branching had been permitted. New England banks suffered a similar fate in 1990–92 when the diversification permitted by statewide branching and regional interstate holding companies again was insufficient to prevent numerous failures following collapse of the region's real estate market.<sup>31</sup>

Banks have avenues for geographic diversification even where branching is prohibited, and may not take advantage of greater diversification

<sup>29</sup>The source of this information is the Conference of State Bank Supervisors (1980). South Dakota is listed in this source as having unlimited statewide branching. After July 1, 1969, however, branch banks could be established only through merger.

<sup>30</sup>The coefficient of correlation between the number of banks per capita a state had on December 31, 1979, and its average annual bank failure rate during 1980–92 is  $-0.17$ .

<sup>31</sup>Randall (1993) investigates the causes of recent New England bank failures.



Figure 6  
State Branching Laws on December 31, 1979

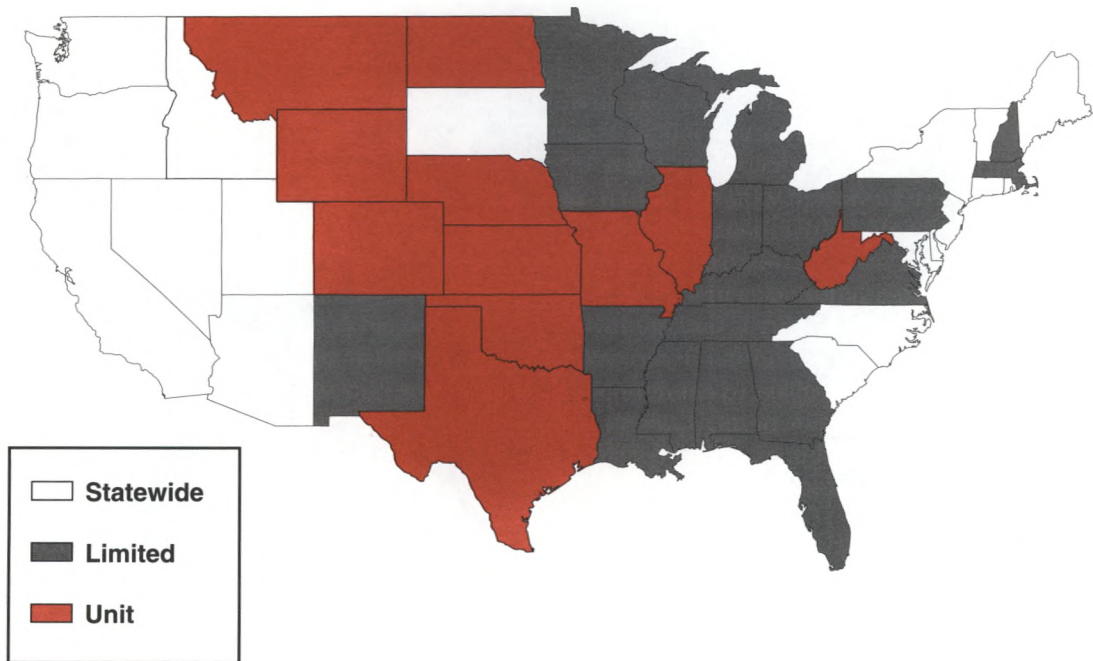


Figure 7  
Banks Per 1,000 Persons on December 31, 1979

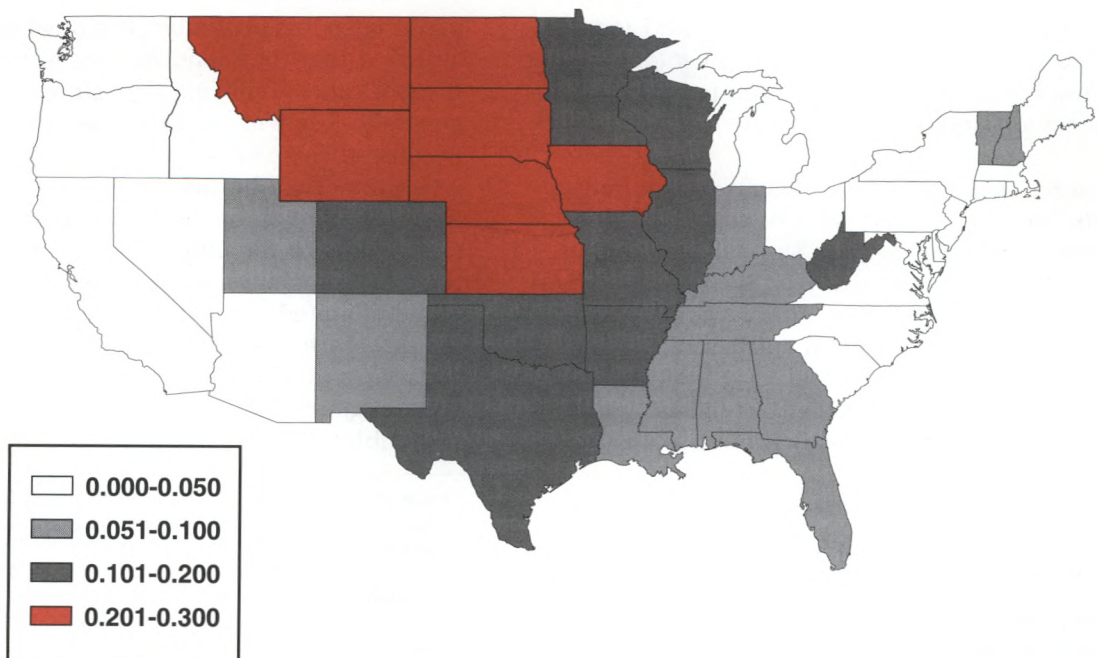
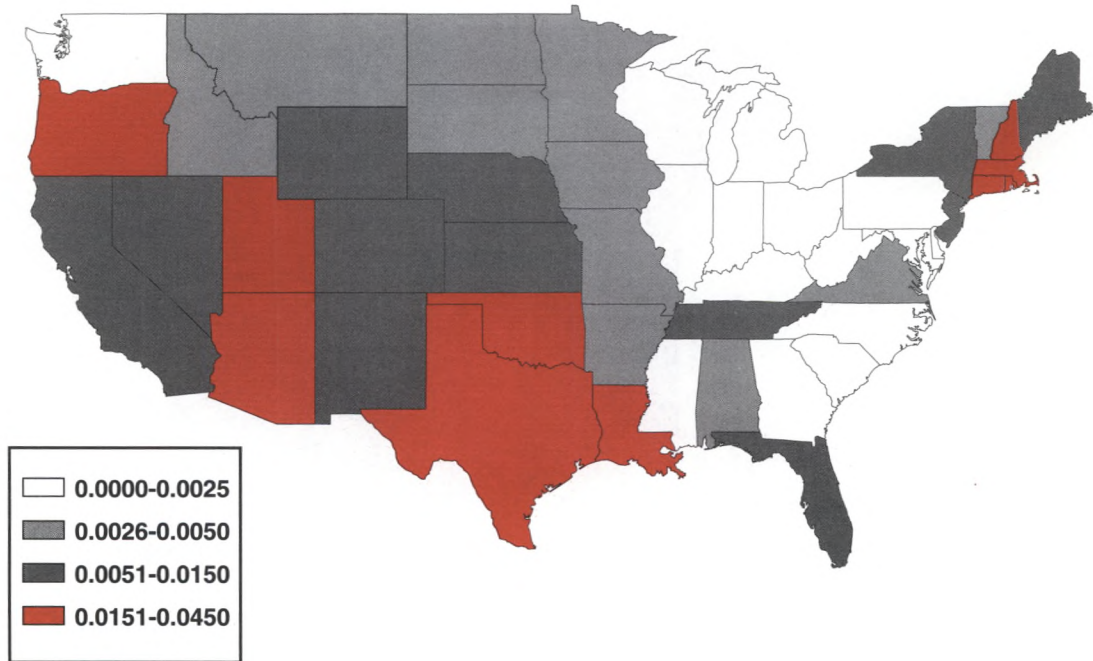




Figure 8  
Average Commercial Bank Failure Rate, 1980-1992



opportunities if they are available, but most observers accept the argument that the freedom to branch makes diversification easier. Further liberalization of branching laws might lead to further declines in the number of banks and to larger average bank size, however, and today the debate about branch banking centers largely on the issues of service, competition and the efficiency of large banks.

Larger average bank size might reduce industry costs because of economies of scale, i.e., that average unit cost declines as total firm output rises. A widely cited study by Boyd and Graham (1991) suggests, however, that large banks may not be more efficient than small banks. They find that between 1976 and 1987, banks with assets in the range of \$25-\$100 million had a higher average rate of return on assets than

either smaller or larger banks. Between 1988 and 1990, those in the \$100-million-to-\$1-billion class had the highest average rate of return. Moderate-size banks also had the highest average returns on equity. Not only have larger banks been less profitable, but Boyd and Graham also find that they tend to have lower equity/asset ratios, implying that large banks are generally less well protected against insolvency. Because their evidence comes from a period when interstate branch banking was almost entirely prohibited, however, the usefulness of their evidence for indicating whether or not interstate branching networks would be efficient may be limited.<sup>32</sup> Their apparent success in the South before the Civil War, and the prevalence of large branching organizations in other countries, suggest that such organizations can be profitable.<sup>33</sup>

<sup>32</sup>Furthermore, large banks may be less profitable because they tend to operate in more competitive markets than small banks. Like Boyd and Graham (1991), however, most studies, such as those surveyed by Humphrey (1990), find that scale economies are exhausted for banks of relatively modest size and that the largest banks in the United States are less efficient than smaller banks. These studies tend to focus on the entire banking firm, though, and Toews (1992) finds evidence of substantial scale economies for individual banking functions.

<sup>33</sup>Moreover, Calomiris and Schweikart (1988) find that interstate branching organizations in the South withstood financial distress better than unit banks in Northern states. Similarly, Canada, whose banking system is comprised of a few large banks with nationwide branches, did not experience the extent of financial disruption present in the United States during the Great Depression. See Haubrich (1990) and Kryzanowski and Roberts (1993).



Increased branching within states explains some of the recent decline in the number of banks in the United States. Interstate branching would likely cause further consolidation. If branching leads to greater diversification of bank assets, or if large branching networks are able to deliver banking services more efficiently than is presently possible, then expanded branching powers might strengthen the industry and help it cope with increased competition. Moreover, because the fixed costs of operating a branch office are low, consumers would likely benefit from increased competition if banks were given greater authority to branch.<sup>34</sup> The experience with branch banking in the United States is perhaps still too limited to show clearly how much the size and structure of the American banking system would change if interstate branching becomes a reality. The rapid growth of branch banks in recent years, however, indicates that banks have responded to the easing of branching restrictions and that further easing would likely lead to further extensions of branching networks.

## FINANCIAL SERVICES

The consequences of permitting commercial banks to sell insurance, underwrite corporate securities or offer a variety of other financial services are perhaps even less certain than the implications of interstate branching. The Banking Act of 1933 forced the separation of commercial and investment banking, and though financial innovation and regulatory interpretation has, over time, expanded the securities activities of banks, strict limits on many securities-related services remain.<sup>35</sup> For example, banks are largely prohibited from underwriting, distributing and owning securities issued by private corporations. Researchers have conjectured how authority to offer a variety of financial services might alter banking markets in the United States by simulating mergers of commercial banks and other financial service firms, and by studying banks engaged in such activities in

other countries.<sup>36</sup> This section reviews a third research area which examines the performance of U.S. commercial banks with securities operations prior to the Banking Act of 1933.

In the United States, commercial banks became involved in the securities business on a large scale during World War I, when many banks invested in and sold war bonds. The success of war bond drives and the growing interest of the public in securities ownership led many banks to offer an increasing variety of investment services. Commercial banks also experienced a decline in commercial loan demand much like that of recent years, as more and more firms found that issuing securities in the money and capital markets was less expensive than borrowing from banks.<sup>37</sup> Furthermore, the promise of high returns drew many bank depositors to securities markets, and, thus, banks experienced increased competition for funds that is again very reminiscent of recent experience. In the 1920s, banks responded to increased competition by offering a variety of securities services, such as underwriting, distribution and brokerage services. Following waves of bank failures in the early 1930s, Congress imposed strict limits on the securities activities of banks, however, because commercial bank involvement with securities was widely thought to have been an important cause of the banking crisis.

Senator Carter Glass and other proponents of the Banking Act of 1933 viewed bank ownership of securities and bank lending to investors on security collateral as harmful to banks, depositors and the economy. Security underwriting and ownership had increased bank risk, they charged, and made it more likely that a collapse of security prices, such as the stock market crash in October 1929, would cause widespread bank failures. Glass (1933) argued that by making loans on security collateral, underwriting new issues and trading in securities, banks had fueled security speculation, drawn funds away from "legitimate" uses and contributed to instability of both securities markets and the banking system:

<sup>34</sup>Calem (1993) argues that interstate branching would increase competition and improve access to banking services for consumers.

<sup>35</sup>Kaufman and Mote (1990) describe the expansion of bank securities activities since 1933 and argue that liberal interpretation by regulators and the courts have permitted banks to offer a variety of securities services. Benston (1990) also details the securities activities that banks are permitted to perform under federal law.

<sup>36</sup>See Boyd and Graham (1988) and Benston (1990).

<sup>37</sup>See Currie (1931).



There seems to be no doubt that a large factor in the overdevelopment of security loans—and in the dangerous use of the resources of bank depositors for the making of speculative profits, with the risk of hazardous losses—has been the perversion of national and state banking laws. The greatest danger is seen in the growth of 'bank affiliates' which devote themselves in many cases to perilous underwriting operations, stock speculation, and maintaining a market for the bank's own stock...

Supporters of the Banking Act of 1933 also alleged widespread abuses of fiduciary responsibility by banks that underwrote and distributed securities. Such allegations included misrepresentations to unsophisticated customers about the risk of securities, the sale of low-grade securities to bank trust accounts, the disposal of non-performing loans via securitization and manipulation of a bank's own stock.

Today, the most vigorous opponents of expanded powers for banks are securities dealers, insurance agents and others with a financial interest in limiting competition, though economists have not reached a consensus on the appropriate activities of banks, particularly their use of government-insured deposits.<sup>38</sup> This section reviews recent research on commercial bank securities activities before 1933. This research generally finds little support for the arguments used to justify the separation of commercial and investment banking in the 1930s, which is significant because many of these arguments are still used to justify their continued separation.

Early studies of bank involvement in the securities business generally accepted the view that such activities increased bank risk and were subject to abuse.<sup>39</sup> This view remained largely unchallenged for many years and was the basis of regulatory and court decisions further defining bank securities-related activities. Recent re-examinations of bank securities operations in the period before 1933, however, have found little evidence of increased risk to the banking system or abuse.

White (1986) investigates whether security operations increased the probability of commercial bank failure during the Great Depression. In these years, most bank securities operations were conducted by in-house bond departments or separate security affiliates. Affiliates were separately incorporated entities but typically had the same shareholders as the parent bank. During the Great Depression, the failure rate of the 145 national banks operating bond departments in 1929 was 7.6 percent, and the failure rate of the 62 national banks operating securities affiliates was 6.5 percent. By contrast, 26.3 percent of all national banks failed between 1930 and 1933, and, hence, national banks with securities operations had a substantially lower failure rate than other national banks. White suggests that economies of scale and greater opportunities for diversification might explain the difference in failure rates since banks with securities operations were typically larger than other banks.<sup>40</sup>

Proponents of separating commercial and investment banking frequently claimed that variability in the earnings of securities affiliates caused excessive fluctuations in the earnings of their parent banks. Nevertheless, White found no significant correlation between the rates of return of securities affiliates and those of their parent banks. His evidence casts doubt on the validity of the argument that securities activities increase the risk of bank failure.

Benston (1990) addresses a second justification for the separation of commercial and investment banking—that the commingling of investment and commercial banking activities produces significant conflicts of interest. The original proponents of separating commercial and investment banking charged that commercial banks had taken advantage of small, unsophisticated investors who trusted banks to give them prudent advice about securities. Today, similar arguments are made in favor of limiting bank involvement with securities and mutual funds. Proponents of maintaining the status quo note a possible conflict between an investment bank's desire to promote securities it underwrites and a commercial bank's

<sup>38</sup>Some economists favor so-called "narrow" banking proposals by which banks are restricted in their use of insured deposits to a limited number of very safe assets. See Spong (1993) for a discussion of narrow banking. Other economists prefer the opposite extreme of universal banking, by which banks are permitted to hold a variety of assets and offer securities, insurance, real estate and other financial services. See Benston (1990) for arguments in favor of universal banking.

<sup>39</sup>The most comprehensive of such studies is Peach (1941).

<sup>40</sup>White also estimates a probit regression model in which he finds that, after controlling for various financial measures reflecting management, banks with securities affiliates had a significantly lower chance of failure than other banks, while banks with an active bond department had neither a greater nor lesser chance of failure.



duty to provide disinterested investment advice. Other arguments suggest the temptations a commercial bank might have to underwrite securities so a borrower can repay unprofitable loans, or to place unsold securities in the bank's trust accounts. Benston, however, contends that when commercial banks were allowed to deal in securities, conflicts of interest did not lead to widespread abuses. Moreover, he argues that many of the conflicts cited by critics of commercial banks were or could be eliminated through regulation. For example, when commercial banks were permitted to sell securities, their securities affiliates were prohibited from selling to the trust accounts of the parent bank.

Benston points out that potential conflicts of interest exist with nearly all financial transactions, and the separation of commercial and investment banking does not guarantee disinterested advice from either commercial or investment banks. For example, a commercial bank might attempt to persuade a customer to borrow from the bank rather than issue securities through an underwriter, or steer customers seeking investment advice to a particular securities dealer if the dealer maintains a large deposit with the bank. Similarly, securities firms might attempt to persuade investors to buy securities they underwrite rather than those underwritten by another firm, or induce small savers to buy securities instead of bank certificates of deposit.

Benston contends that conflicts of interest are likely to be less prevalent for commercial banks with securities operations than for specialized securities firms. For example, a potential borrower might get better advice from a bank than a securities firm about whether to take a loan or issue securities if the bank could offer both. Similarly, there would seem to be less potential for biased advice to an investor from a bank that could provide a variety of investments, from insured deposit accounts to mutual funds to individual securities.

Kroszner and Rajan (1993) examine one element of the conflict-of-interest argument. They compare the performance of securities underwritten by commercial banks with those underwritten by investment banks during the 1920s as a measure of whether commercial banks were

able to fool the public into buying low-quality securities. Among a matched sample of bonds underwritten by commercial banks or their securities affiliates and bonds underwritten by investment banks, Kroszner and Rajan find that securities underwritten by commercial banks had the lower default rate. The default rate of low-grade securities underwritten by commercial banks was especially low relative to that of investment banks. Commercial banks also tended to underwrite higher-quality securities than investment banks. Kroszner and Rajan suggest that securities markets may have forced commercial banks to issue more high-grade, safe securities because of possible conflicts of interest for commercial banks involved in underwriting. If true, their evidence indicates that the investing public disciplined commercial banks with respect to the securities they underwrote. So, even if potential conflicts of interest between commercial and investment banking exist, Kroszner and Rajan conclude that repeal of legal constraints on commercial bank underwriting would not likely harm the public.

Proponents of allowing banks to offer securities services point to potential benefits for the economy. Banks offering securities services might benefit from economies of scope. Economies of scope exist if the total cost of providing a variety of services within a single firm is lower than if the services are provided by different firms. An important function of banks is to gather and evaluate information about potential borrowers and provide access to the payments system. Commercial banks might be able to underwrite securities, sell insurance, offer real estate services and provide other financial services at lower cost to consumers than currently available because of economies in the processing and use of financial information.<sup>41</sup>

Calomiris (1993) argues that, historically, branching restrictions and regulations limiting the scope of banking activities significantly increased the cost of capital for U.S. firms. Because of their comparative advantage as evaluators of information about potential borrowers, commercial banks have tended to be the principal lenders to new firms. As firms mature and their creditworthiness becomes widely known, they tend to borrow relatively less from

<sup>41</sup>Mester (1987) provides an introductory discussion of economies of scope in banking. Pulley and Humphrey (1993) find little evidence of economies of scope in the joint pro-

duction of loans and deposits by U.S. banks during 1978–92, but do not address the possibility of significant economies in providing loan and securities services.



commercial banks and issue more securities through investment banks. Banks that provide both loans and underwrite security issues could economize on the gathering of information about firms and accelerate the process by which a firm moves from relatively high-cost borrowing in the form of bank loans to lower-cost placement of debt and equity. If commercial banks were permitted to provide both loans and underwrite securities, they could provide a firm's financing needs over its entire life cycle. Banks could then spread the cost of acquiring and evaluating information about a new firm over many years and reduce the cost of credit for firms in their early years when investment needs are high and cash flow is low. Restrictions on branching, on the other hand, "implied a mismatch between the scale and scope of firms and those of their bankers."<sup>42</sup> Such restrictions impeded banks from achieving the size necessary to finance the borrowing needs of large firms. They also precluded a potentially very efficient means of financing industrial development—the placement of corporate securities underwritten by commercial banks through their branch offices. Moreover, branching restrictions probably increased the cost of transactions because firms operating in multiple markets were forced to rely on different banks in each market for payments services.

The United States remains a long way from having a system of universal banking, and any significant change in regulation, such as repeal of restrictions on the securities activities of commercial banks, requires careful study of numerous issues. Recent research suggests that many of the arguments for separating commercial and investment banking, which once seemed compelling, are not supported by historical evidence. The historical record is silent on some issues, however, such as the question of what securities activities commercial banks should be permitted to fund with insured deposits. Leaving aside these issues, removal of legal restrictions on bank securities activities would likely strengthen the industry by allowing it to compete more effectively with other intermediaries and banks in other countries. Broadening securities powers would probably favor larger banks, however, and might also encourage further consolidation of the industry.

## CONCLUSION

Although the number of commercial banks has declined sharply since 1984, by other measures, such as the number of bank offices and total bank assets relative to gross national product (GNP), the banking industry has not been shrinking. Some economists contend that the banking industry has excess capacity. Even more argue that without significant changes in regulation, the banking industry is destined to wither. The relaxation of restrictions on interstate branching and the securities activities that commercial banks are permitted to perform are two of the most frequently proposed regulatory changes that proponents view as necessary to preserve the health of the banking industry.

History provides useful evidence about the efficacy of branch banking and the securities activities of commercial banks. The United States experienced a high number of bank failures in the 1980s because its banks were not sufficiently diversified. As in the 1920s and other decades when failures were high, a lack of geographic diversification left many banks vulnerable to economic downturns. The strongest argument in favor of interstate branch banking is that it enhances the ability of banks to diversify across regions so that they can offset losses in some regions with profits in others. Questions about the technical efficiency of large branching networks and the effects of interstate branching on competition and access to banking services remain controversial.

Perhaps even more controversial is the debate about the separation of commercial and investment banking. Securities activities continue to be widely viewed as too risky for commercial banks, though, ironically, many commentators who hold this view also complain that banks are not making enough loans. Evidence from the era before legal separation of commercial and investment banking indicates that commercial banks with securities operations were better diversified and less likely to fail than other banks. Moreover, it appears that commercial banks underwrote higher-quality securities than investment banks. Although the historical record cannot address all issues of relevance today, the evidence generally supports the view that banks would benefit from an increased variety of financial services.

<sup>42</sup>Calomiris (1993).



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# Indicators of Monetary Policy: The View from Implicit Feedback Rules

**A** FREQUENTLY CITED THEORETICAL framework for the conduct of monetary policy consists of a policy instrument, an intermediate policy target and a long-run policy objective. The policy instrument is a lever which the central bank can manipulate to achieve its intermediate target. Possible choices for the policy instrument include the quantity of bank reserves, the monetary base (bank reserves plus currency in circulation) or a short-term interest rate. Monetary policymakers aim at a value of the intermediate target variable that will make current monetary policy consistent with a long-run policy objective, such as price stability.<sup>1</sup> Potential intermediate target variables include nominal gross domestic product (GDP) and monetary aggregates. Ideally, the intermediate target variable is both responsive to policy actions and closely related to inflation in the long run.

In reality, however, the Federal Reserve does not explicitly commit itself to a particular intermediate target variable. Instead, policymakers

rely on a number of *indicators* to evaluate current monetary policy. In the context of a long-run inflation objective, the stance of monetary policy can be interpreted in terms of whether current policy actions are expected to lead to eventual accelerations or decelerations in the inflation rate. Policy indicators are variables (perhaps generated within models) believed to provide reliable information on the stance of current policy. Unfortunately, traditional indicators of monetary policy have given unusually mixed signals in the last several years.<sup>2</sup> For instance, some economists believe that recent rapid M1 growth portends future increases in inflation, whereas others find signs of further disinflation in slow M2 growth.<sup>3</sup> To overcome this problem, some researchers have suggested characterizing policy with alternative models of the way the Federal Open Market Committee (FOMC) responds to feedback from potential target variables, such as nominal GDP and M2.<sup>4</sup> These models provide a baseline policy, a path of prescribed movements of the policy instru-

<sup>1</sup>In this article, I assume that the long-run objective is a low (possibly zero) average inflation rate.

<sup>2</sup>One way to infer the stance of monetary policy in a world of multiple, possibly conflicting, policy indicators is the narrative approach, first pioneered by Friedman and Schwartz (1963) and re-introduced by Romer and Romer (1989). The narrative approach involves careful study of the historical record, especially summaries of policymaking meetings, to determine the policy intentions of the monetary authority. Many studies using this methodology evaluate economic performance following dates when policy intentions seemed to shift sharply. The retrospective nature of the

narrative approach limits its usefulness to policymakers, however, because they often wish to assess whether recent policy actions have been consistent with long-term objectives.

<sup>3</sup>Ritter's (1993) synopsis of FOMC policy discussions in 1992 refers to the conflicting signals from M1 and M2 as a monetary conundrum.

<sup>4</sup>Motley and Judd (1993), for example, have suggested using monetary rules as a source of a baseline policy for the purposes of policy discussion.



ment, which we can compare with actual policy, the actual path of instrument movements. The difference between the actual path and the prescribed path of the policy instrument constitutes a measure of the stance of policy relative to the baseline. In this way, the five models of policy in this article generate five monetary policy indicators that can suggest whether recent policy has changed relative to baselines.

Alternatively, because the FOMC does not explicitly identify a particular intermediate target variable, one can view the models of policy examined in this article as investigations into whether the FOMC conducts policy as if nominal GDP or M2 were the intermediate target variable. Nominal GDP targeting, in particular, has attracted attention in recent years as a way to achieve an average inflation rate close to zero in the long run by constraining nominal GDP so it grows at about the rate of the real economy.<sup>5</sup>

This article uses implicit feedback rules as models of policy to generate monetary policy indicators. As with all indicators, indicators generated from these models of policy can give conflicting signals, yet the assumptions that lie behind each feedback rule are sufficiently testable to allow some scrutiny of the reliability of a given policy indicator. Therefore, I generate and evaluate five policy indicators, based on different sets of assumptions, before reaching some tentative conclusions. Three of the policy models assume that nominal GDP is the intermediate target variable and two use M2.

Results from two of the nominal GDP targeting models of policy suggest that the FOMC targeted long-run nominal GDP growth at either a 4.4 percent annual rate or a 6.5 percent rate from 1983 to 1990. The former model indicates that monetary base growth has been too rapid since 1990, relative to the model's prescriptions. The latter model, in contrast, indicates that monetary base growth has been too slow since 1990, relative to that model's prescriptions. The third nominal GDP targeting model implies that the FOMC was targeting nominal GDP growth at a 5.7 percent rate from 1983 to 1990. According

to the third model, monetary policy actions accommodated lower nominal GDP growth in the recession of 1990-91 without providing clear-cut evidence of a change in the long-run inflation objective between the 1980s and 1990s.

The results also suggest that monetary policy in the early 1990s has generally been consistent with the two models of M2 targeting studied here. In these models, the ratio between M2 and the monetary base must be predicted one quarter ahead. I find that the recent slow growth in M2, relative to the FOMC target ranges, could be attributable to prediction errors resulting from a breakdown in the relationship between the monetary base and M2. In other words, it is difficult in the current financial environment to forecast the effects of policy actions on M2. Furthermore, forecasting results suggest that the breakdown in the relationship between M2 and the monetary base is more severe than the much-discussed breakdown in M2 velocity.

## FEEDBACK RULES

For the purposes of this paper, a feedback rule is a pre-commitment on the part of the monetary authority as to how it will use policy levers in response to developments in its intermediate target variable. Under a feedback rule, the Fed would monitor the target variable and adjust its instruments in response, but these conditional responses would be pre-specified. One well-known feedback rule proposed by McCallum (1987) uses the adjusted monetary base as a policy instrument to target nominal GDP. All three models of nominal GDP targeting in this article share the assumption in McCallum's rule that the long-run inflation objective remains constant.<sup>6</sup> If the inflation objective were to change, the nominal GDP targeting feedback rules would change also. The adjusted monetary base serves as a convenient measure of the use of policy levers, because Federal Reserve policy actions are quantitatively summarized in the adjusted base: changes in nonborrowed reserves, borrowed reserves and reserve requirements. McCallum's rule serves as one model of de facto Fed policy, whereby the Fed

<sup>5</sup>Bradley and Janssen (1989) summarize the rationale for nominal GNP targeting.

<sup>6</sup>The nominal GDP targeting models target a constant rate of long-run nominal GDP growth, as will be shown below. Assuming that the long-term growth rate for the real economy is constant and policy-invariant, the long-term inflation objective will be constant.



is assumed to target a growth path for nominal GDP.

If the FOMC were targeting M2, rather than nominal GDP, how might such a policy be implemented? As a second model of de facto Fed policy, I assume that the Fed gears its policy (again summarized by the changes in the adjusted monetary base) to target M2 at the midpoint of the M2 cone, which the Fed reports every year in its *Monetary Policy Objectives* publication.<sup>7</sup> If the announced cone were the policy objective such that the Fed limited itself to policies intended to steer M2 toward the midpoint, then we could consider M2 targeting to be a short-run feedback rule.

Like McCallum's nominal GDP targeting rule, M2 targeting models generate implied policies in terms of base growth.<sup>8</sup> Recent base growth can then be characterized as consistent or inconsistent with the model-implied policies. Unlike the nominal GDP targeting models of policy, however, the two M2 feedback rules do not necessarily assume that the long-run inflation objective remains constant. If one accepts the proposition of Hallman, Porter and Small (1991) that the long-run velocity of M2 is constant, then a permanent change in the target rate of M2 growth implies a permanent change in the target rate of nominal GDP growth and in the long-run inflation objective.

### **The Role of Forecasts in Feedback Rules**

Models in which M2 is the target variable require forecasts of the ratio between M2 and the monetary base to identify the rate of base growth believed sufficient to put it at the midpoint of the FOMC's target range. If the FOMC were targeting nominal GDP with McCallum's rule, on the other hand, it would require forecasts of the velocity of the monetary base. One way to make these forecasts is to use average velocity growth over the past four years as a

forecast of the next quarter's velocity growth.<sup>9</sup> Moving-average (MA) forecasts gradually incorporate shifts in the trend of velocity growth, yet assume that many changes in velocity growth are transitory. As an alternative, Dueker (1993) generates forecasts of base velocity with a time-varying coefficient (TVC) regression model with heteroscedastic errors. An advantage of the TVC regression model, relative to a four-year moving average, is that the forecasting information set includes not only past values of the dependent variable, but also a host of explanatory variables.<sup>10</sup> The advantage of allowing for time-varying coefficients, relative to fixed-coefficient models, is that they can adapt to structural breaks in the relationships between the dependent and explanatory variables. This article includes comparisons of models of monetary policy that use both the moving-average forecast method and the TVC forecast method.

### **A Forecast Comparison for Base Velocity**

Because forecasts play a large role in the models of monetary policy presented here, figure 1 illustrates the forecast performance of the time-varying coefficient model for quarterly base velocity growth.<sup>11</sup> In general, the TVC model forecasts base velocity well until 1991, after which the model has overpredicted base-velocity growth. As a comparison, figure 1 includes four-year, moving-average forecasts and shows that the MA forecasts display much less variation than forecasts from the TVC model. This difference suggests that the choice of forecasting models can have a large impact on nominal GDP targeting models. It is also worth noting that the mean-squared forecast error for the moving average is more than three times that of the TVC model. Nevertheless, figure 1 shows that since 1991 both forecast methods have been overpredicting base velocity growth by similar magnitudes.

<sup>7</sup>Congress, in the Humphrey-Hawkins Act of 1978, requires the Federal Reserve to report any targets it sets for monetary aggregates, although such targets may not necessarily be a primary objective of monetary policy.

<sup>8</sup>There are, of course, many other possible targets, but I restrict attention to these two interesting cases.

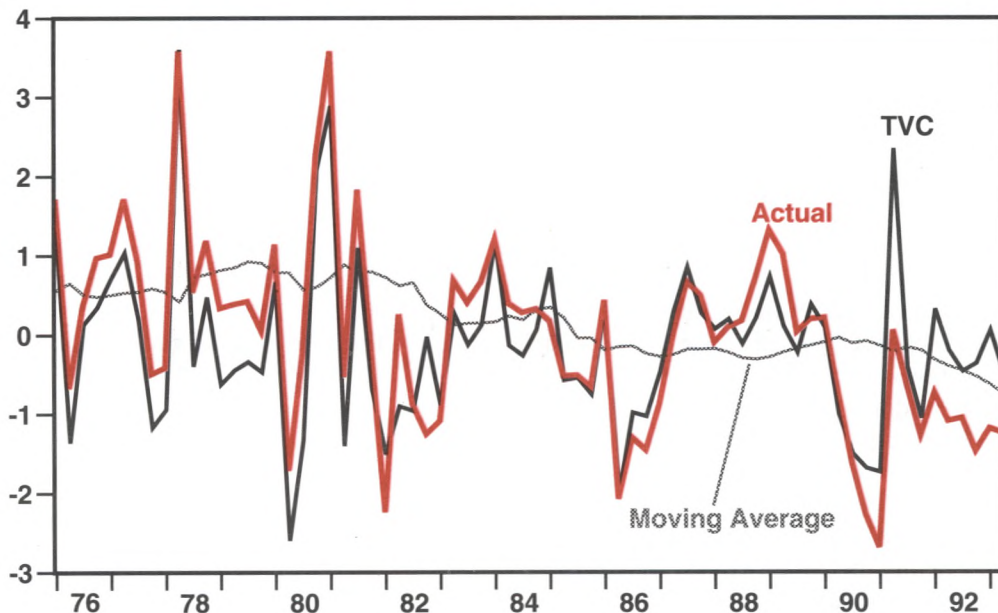
<sup>9</sup>McCallum (1987) uses four-year, moving-average forecasts.

<sup>10</sup>The explanatory variables used were lagged changes in the three-month Treasury bill rate and lagged growth in the monetary base. Future work might include a long-term bond rate as well.

<sup>11</sup>The appendix discusses the specification of the forecasting model.



Figure 1  
**Quarterly Growth in Base Velocity, Forecasted Growth from TVC Model and Four-Year, Moving-Average Forecasts**



## CHARACTERIZING MONETARY POLICY FROM 1983-1990 WITH NOMINAL GDP FEEDBACK RULES

### Fixed GDP Target Paths

McCallum-type monetary rules offer models of nominal GDP targeting policies:<sup>12</sup>

$$(1) \Delta \ln MB_t = \lambda_0 - \Delta \ln V_{t-1} + \lambda_1 (\ln \hat{GDP}_t - \ln GDP)_{t-1}$$

$$\Delta \ln \hat{GDP}_t = \lambda_0 \forall t,$$

where  $MB$  is the monetary base,  $\Delta \ln V_{t-1}$  is the forecasted value of base velocity growth, and  $\hat{GDP}$  is the target level of nominal GDP. The parameter  $\lambda_0$  equals the growth rate of target nominal GDP, whereas  $\lambda_1$  specifies how much to raise base growth in the coming quarter in response to a given percentage gap between target and actual nominal GDP. So, in characteriz-

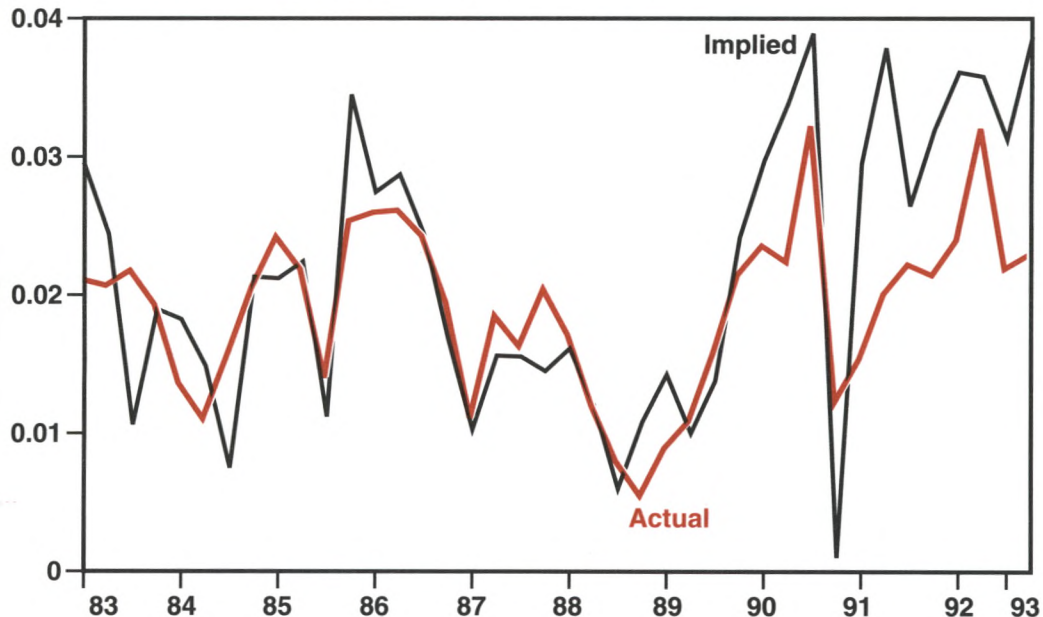
ing monetary policy with a monetary rule such as equation (1), one must choose a velocity forecasting model, specify in which quarter actual and target nominal GDP were equal, and choose values for  $\lambda_0$  and  $\lambda_1$ . This section compares models of monetary base growth stemming from two versions of the nominal GDP feedback rule found in equation (1): One model uses a time-varying coefficient model to generate forecasts of base velocity growth and the other uses four-year, moving-average forecasts. The former will be called the TVC GDP model and the latter the MA GDP model. For each model, parameter values for  $\lambda_0$  and  $\lambda_1$  are chosen to minimize the mean-squared error between actual base growth and the model-implied base growth from the third quarter of 1983 to the first quarter of 1990. To examine whether implicit monetary policy feedback rules benchmarked in the 1980s can explain monetary policy actions to the present, post-1990 data are left as out-of-sample observations.

<sup>12</sup>See McCallum (1987) for details of his proposed rule.



Figure 2

### Quarterly Growth in Monetary Base and Growth Implied by a GDP Targeting Rule with TVC Forecasts of Base Velocity



### Results for TVC GDP Model

For the TVC GDP model, the minimum mean-squared error over this time period is achieved when  $\lambda_0 = 0.0159$ ,  $\lambda_1 = 0.275$  and  $GDP = \hat{GDP}$  in the first quarter of 1985.<sup>13</sup> A value of 0.0159 for  $\lambda_0$  corresponds to a 6.5 percent annual growth rate for target nominal GDP. Figure 2 plots the base growth implied by the TVC GDP model and actual base growth. The TVC GDP model explains the in-sample, pre-1990 data fairly well but, since 1990, base growth has been below that implied by the model. Figure 3 plots nominal GDP and the target level implied by the TVC GDP model. It shows a slowing in nominal GDP growth since mid-1990. The growing gap between the rule-implied target and actual

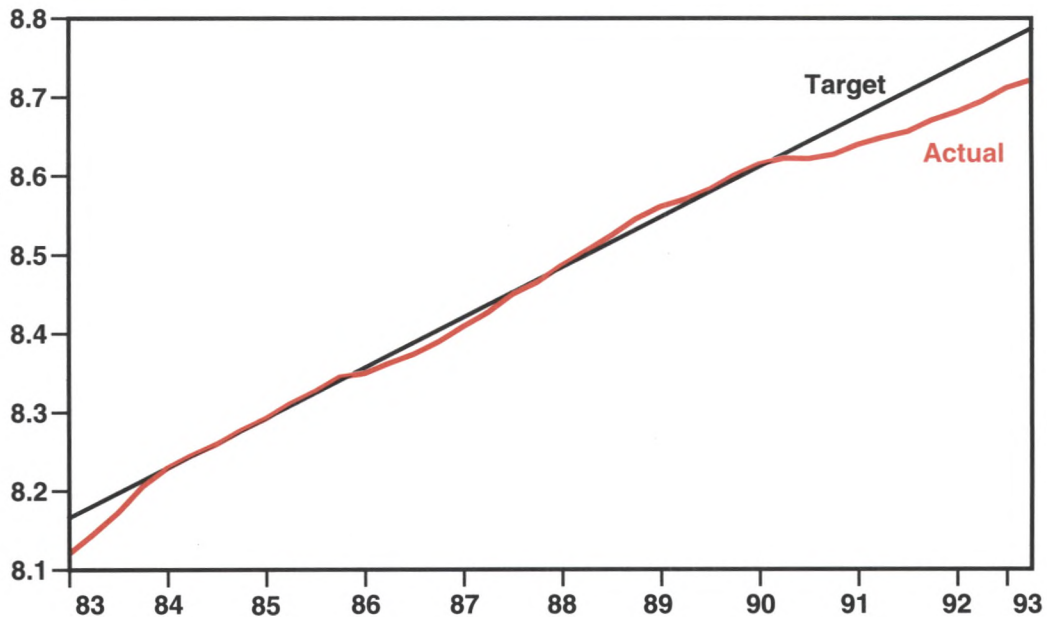
nominal GDP accounts for the high rates of base growth implied by the model from 1991 to the present. The feedback rule in the TVC GDP model would call for an increase of 1.1 percent in the annualized growth rate of the monetary base for every percentage point gap between target and actual nominal GDP. Because actual base growth has not been increased according to this formula in the 1990s, the results are consistent with the view that the FOMC is implicitly targeting a lower path for nominal GDP. Moreover, the fact that the TVC forecasts have been overpredicting base growth in the 1990s (as shown in figure 1) only buttresses this finding because, without the forecast errors, the TVC GDP model would have implied even faster base growth since 1991.

<sup>13</sup>Because of the feedback rule uses the log-level of nominal GDP, discrepancies between first-release nominal GDP data and revised data will not have a large effect on implied base growth. Consider, for example, a revision in annual nominal GDP growth of 2 percent. This relatively large revision would change the log-level of nominal GDP by about one-half of 1 percent for that quarter. When multiplied by  $\lambda_1=0.275$ , the revision would cause a change in the implied growth rate of the monetary base equal to 0.00136. Given the variation of implied base growth in

figure 3, the effect of using revised data is not of a consequential magnitude.



Figure 3  
**Logarithm of Nominal GDP and Target Level Implied by a  
 Nominal GDP Target Rule that Uses TVC Forecasts**



### Results for MA GDP Model

It is also possible to characterize policy with a model of nominal GDP targeting that uses 16-quarter, moving-average forecasts of base velocity, as suggested by McCallum (1987), in what we call the MA GDP model:

$$(2) \Delta \ln MB_t = \lambda_0 - \frac{1}{16} (\ln V_{t-1} - \ln V_{t-17}) \\ + \lambda_1 (\ln \hat{GDP}_t - \ln GDP_{t-1}) \\ \Delta \ln \hat{GDP}_t = \lambda_0 \forall t,$$

where  $V$  stands for the velocity of the monetary base. The MA GDP model explains base growth in the middle to late 1980s with a target path for nominal GDP that is very different from that of the TVC GDP model. The nominal GDP feedback rule with moving-average forecasts explains base growth from the third quarter of 1983 to the first quarter of 1990 with minimum

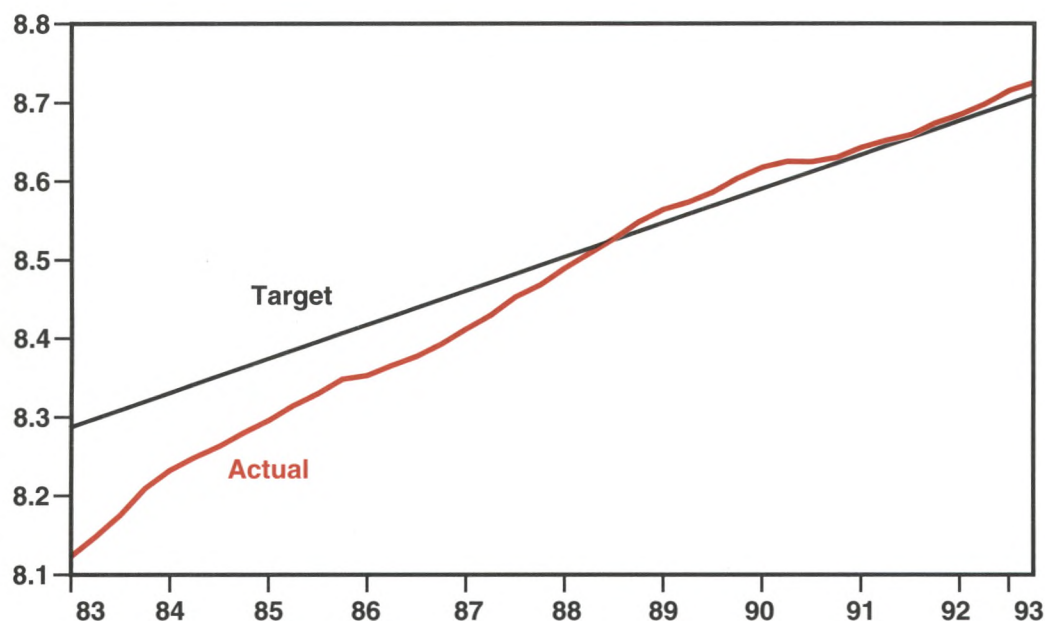
mean-squared error when  $\lambda_0 = 0.0108$ , which corresponds with a 4.4 percent annual growth rate for target nominal GDP,  $\lambda_1 = 0.0945$  and  $GDP = \hat{GDP}$  in the first quarter of 1989.<sup>14</sup>

The results suggest that inferences regarding a target path for nominal GDP are sensitive to the method of forecasting base velocity growth, even though the forecasted values from the two methods have nearly identical means. Figure 4 plots nominal GDP and the target level defined by the MA GDP model. This model suggests that the long-term nominal GDP target growth rate was a relatively low 4.4 percent annual rate in the 1980s. The MA GDP model would explain rapid nominal GDP growth in the middle to late 1980s by indicating that nominal GDP stood well below the target level following the 1981-82 recession. In this case, nominal GDP could grow at about a 7 percent rate without exceeding the target level until 1989. Moreover, nominal GDP has remained only slightly above the implied

<sup>14</sup>The optimal values of the feedback parameters,  $\lambda_1 = 0.275$  for the model that uses forecasts from the TVC model and  $\lambda_1 = 0.095$  for the model that uses moving-average forecasts, are close to the values that worked well in simulations of the two rules in Dueker (1993), 0.25 and 0.10, respectively.



Figure 4  
**Logarithm of Nominal GDP and Target Level as Defined  
 by a Nominal GDP Targeting Model That Uses Moving-  
 Average Forecasts**



target level in the post-1990, out-of-sample observations.

Figure 5 shows that the MA GDP model called for much less variation in base growth than actually took place. The smoothness in the implied base growth rates owes to the four-year, moving-average forecasts of base velocity. Smoothness, however, should not be confused with constancy. The rate of base growth implied by the MA GDP model decreases significantly between 1984 and 1990, as the gap between target and actual nominal GDP narrowed. In the post-1990, out-of-sample period, base growth has consistently been above that implied by the MA GDP rule. Nevertheless, because the moving-average forecasts have generally over-predicted base velocity growth since 1990, as shown in figure 2, the model would have implied faster base growth and, therefore, would have been closer to actual base growth, without the forecast errors.

Given the striking differences in the target paths for nominal GDP implied by the TVC and MA GDP models, it is not surprising that oppos-

ing conclusions emerge concerning whether base growth in the early 1990s has been too high or too low to be consistent with the two models. Actual base growth since 1990 has generally been lower than that implied by the TVC GDP model and too high to be consistent with the MA GDP model, despite the fact that both models have experienced similar forecast errors since 1991.

### **Rebased GDP Target Paths**

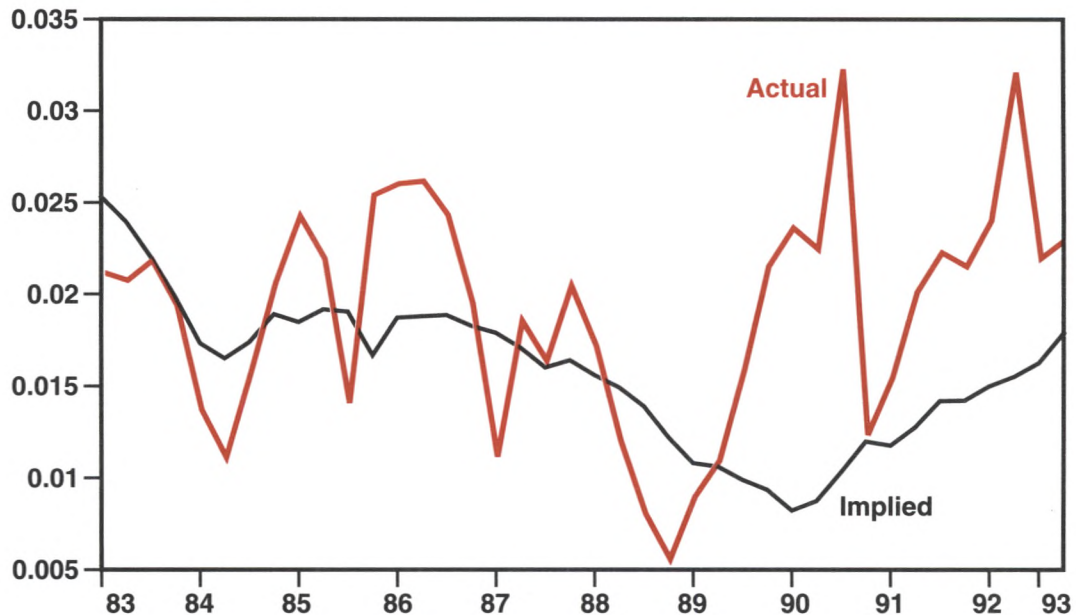
Both of the above models, however, might be overly influenced by the assumption that the FOMC has relentlessly pursued a constant growth path for nominal GDP without making allowances for past mistakes. McCallum (1993) has proposed an alternative to targeting a time-invariant, constant growth path for nominal GDP by making this period's nominal GDP target level a weighted average of last period's target and actual levels:

$$(3) \ln \hat{GDP}_t = \lambda_0 + \delta \ln \hat{GDP}_{t-1} + (1 - \delta) \ln GDP_{t-1}$$

Setting  $\delta = 1$  recovers the time-invariant, con-



Figure 5  
**Quarterly Growth in Monetary Base and Growth Implied  
 by a Model of Nominal GDP Targeting That Uses Moving-  
 Average Forecasts of Base Velocity**



stant growth target path used in the TVC and MA GDP models, whereas setting  $\delta=0$  means that, quarter after quarter, the target is to achieve nominal GDP growth equal to  $\lambda_0$  and no attempt is made to correct for past mistakes.<sup>15</sup> Feldstein and Stock (1993), for example, use a nominal GDP targeting model that sets  $\delta=0$ . A value of  $\delta$  between zero and one allows intermediate cases between targeting a constant growth rate period by period ( $\delta=0$ ) and targeting a fixed, pre-specified path for nominal GDP ( $\delta=1$ ). If  $\delta=1$ , past mistakes are always corrected and never accommodated. If  $\delta=0$ , past mistakes are never corrected and immediately accommodated. If  $\delta$  is between zero and one, past mistakes are gradually accommodated.

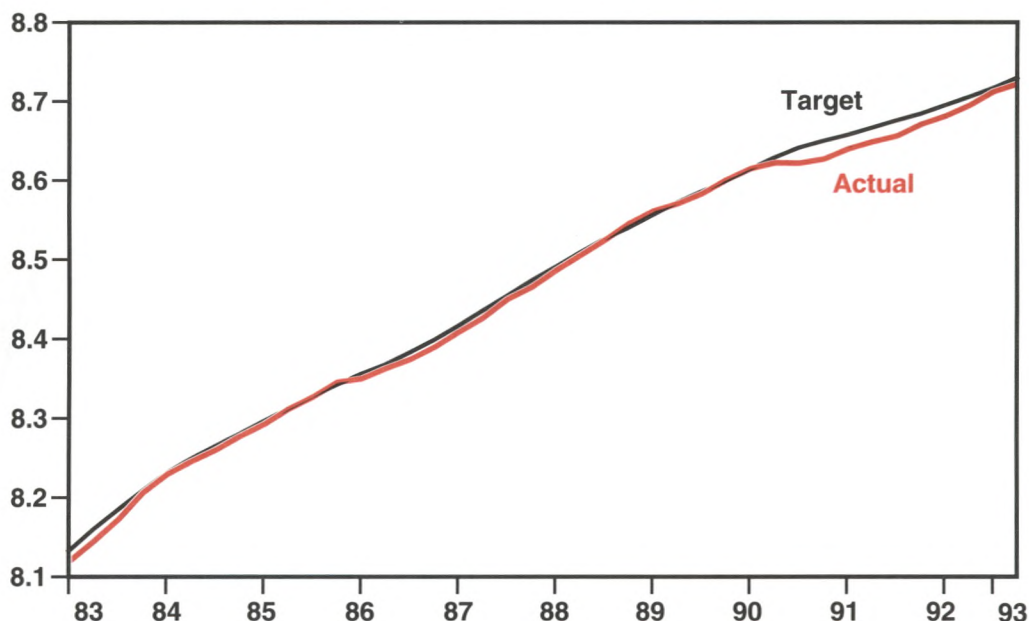
To relax the assumption that all past mistakes will be corrected later, base growth is modeled using a nominal GDP feedback rule with target

nominal GDP determined by equation (3). This model, which uses the time-varying coefficient model to forecast base velocity, is called the re-based target GDP model. The parameter values that minimize the mean-squared error between actual and model-implied base growth from the third quarter of 1983 to the first quarter of 1990 are  $\lambda_0 = 0.0140$ , which corresponds with a 5.7 percent annual rate for target nominal GDP growth,  $\lambda_1=1.043$ ,  $\delta=.698$  and  $GDP=\hat{GDP}$  in the first quarter of 1989. Gradually rebasing the nominal GDP target, as indicated by  $\delta < 1$ , prevents nominal GDP from deviating far from its target level, and thereby permits a larger value for the feedback parameter,  $\lambda_1$ . Figure 6 plots the actual and target levels of nominal GDP, where the target level is defined by the re-based target GDP model. The chart shows that rebasing the nominal GDP target gradually accommodates past periods of nominal GDP growth

<sup>15</sup>Targeting a fixed, pre-specified path for nominal GDP as opposed to a constant growth rate, period by period, is analogous to targeting the price level as opposed to targeting the inflation rate at zero each period. In each case, the choice hinges on whether to accommodate one-time shifts in the level.



Figure 6  
**Logarithm of Nominal GDP and Target Level as Defined by a  
 Nominal GDP Targeting Rule That Rebases the Target**



above or below the expected 5.7 percent rate. The 1990-91 recession, for example, brought a slowdown in nominal GDP growth that temporarily created a positive gap between target and actual nominal GDP. By early 1993, the gap had been bridged, in part due to rebasing the target, as evidenced by a shallowing in the slope of the target path for nominal GDP since 1990. Figure 7 shows the actual and model-implied monetary base growth rates for the rebased target GDP model. The model explains base growth quite well until mid-1990, which is the beginning of the out-of-sample period and also the onset of the recession. During the recession and recovery, actual base growth remained below that implied by the rebased target GDP model until mid-1992. As figure 1 shows, however, the TVC forecasts of base velocity have tended to overpredict base velocity growth in the early 1990s, so the rebased target model, like the other nominal GDP targeting models, would have implied even higher base growth without the forecast errors.

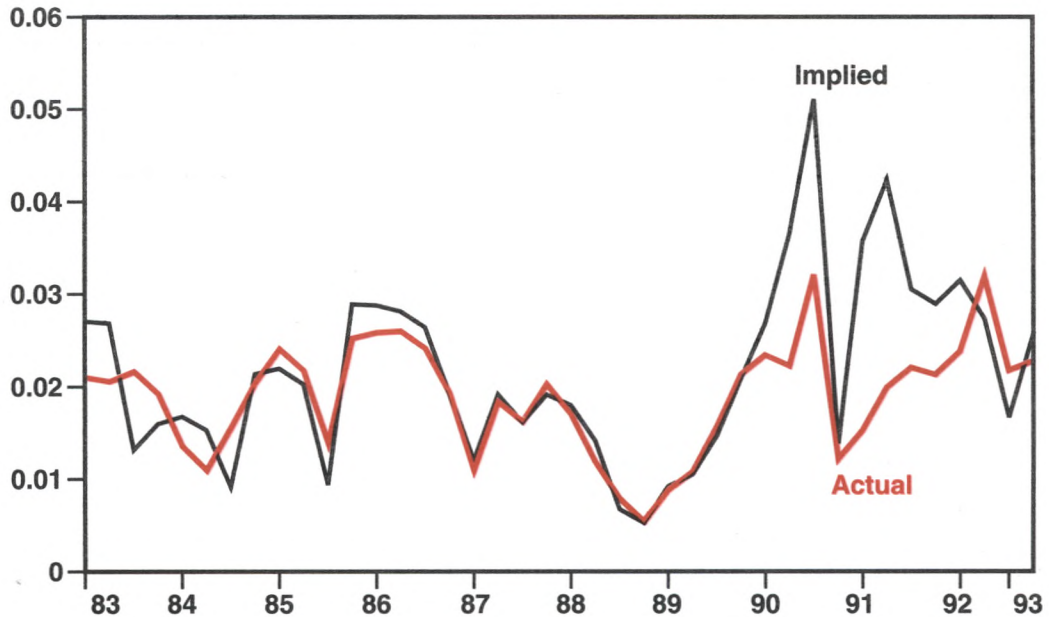
The rebased target GDP model has a lower

in-sample (1983-90) mean-squared error than either the TVC GDP or MA GDP model. Table 1 contains summary measures of the bias and mean-squared error between actual and model-implied base growth, both in- and out-of-sample, for each of the three GDP targeting models. The TVC and MA GDP models explain base growth with nearly identical success, which is somewhat surprising considering the dissimilarity of their implied target paths for nominal GDP. They also do slightly better than the rebased target GDP model (in terms of mean-squared error) in explaining base growth since 1990.

In sum, this exercise illustrates the difficulty of determining the Fed's long-run inflation objective from models of nominal GDP targeting. The results for the TVC GDP and MA GDP models show that alternative models of monetary policy can explain base growth with fairly similar success, while implying dramatically different target paths for nominal GDP. Moreover, the divergence in results for the TVC and MA GDP models does not appear to have a simple intuitive explanation. It appears that



Figure 7  
**Quarterly Growth in Monetary Base and Growth Implied by a  
 Nominal GDP Targeting Rule That Rebases the Target**



more time and data are needed to determine which of these two models best describes monetary policy objectives. In time we can observe whether nominal GDP more closely adheres to the MA GDP model's 4.4 percent growth path or the TVC GDP model's 6.5 percent growth path. Stated in terms of inflation rates, the MA GDP model suggests that the average inflation rate will be about 2 percent, allowing for roughly 2.5 percent growth in potential real GDP. The TVC GDP model, on the other hand, predicts a higher average inflation rate of about 4 percent.

Fortunately, however, we are not forced to draw inferences from only these two models, because the rebased target GDP model appears to dominate both in terms of in-sample, mean-squared error in explaining base growth. From the rebased target GDP model, which has a 5.7 percent target rate of nominal GDP growth, we can infer that the Fed's long-run inflation objective in the middle-to-late 1980s was approximately 3 percent. Furthermore, after allowing for the slowdown in nominal GDP growth surrounding the recession of 1990-91, the rebased target GDP model does not forcefully indicate a

change in the long-run inflation objective between the 1980s and 1990s. In this context, a persistent and widening gap between target and actual nominal GDP would suggest a change in the long-run inflation objective, and no such gap develops for the rebased target GDP model.

### **CHARACTERIZING MONETARY POLICY FROM 1983-90 WITH AN M2 TARGETING FEEDBACK RULE**

As with models of nominal GDP targeting, I construct models of M2 targeting that employ both moving-average forecasts and forecasts from a time-varying coefficient model. The model that uses a time-varying coefficient forecasting method for the M2/base ratio will be the TVC M2 model, and the model that uses a moving-average method will be the MA M2 model. The assumed short-run feedback rule behind these two models is that the Fed sets base growth to attempt to put M2 at the midpoint of the announced M2 target range, given a forecast of the M2/base ratio. Because M2 has generally lagged below the midpoint (and often



**Table 1**  
**Model Comparison**

Model	1983-1990		1990-1993	
	Mean-Squared Error	Bias	Mean-Squared Error	Bias
Rebased Target GDP	100%	100% ( < 0)	100%	100% ( < 0)
TVC GDP	180%	13% ( < 0)	86%	108% ( < 0)
MA GDP	183%	203% ( > 0)	96%	132% ( > 0)

Note: Expressed as a percent of the quantity for the rebased target GDP model

below the bottom) of its target ranges in the 1990s, one objective of this exercise is to learn whether the shortfall can be attributed to a problem in predicting the M2/base ratio, or to a decision on the part of policymakers to pursue other objectives that preclude placing M2 at the midpoint of the target range.

Figure 8 plots actual base growth and base growth implied by the TVC M2 model. The chart shows that differences between base growth and base growth implied by the model of M2 targeting are not noticeably larger in the 1990s than in the 1980s. Figure 9 provides similar results for the MA M2 model. Actual base growth has been fairly consistent with the base growth implied by either M2 targeting model. Nevertheless, we know that M2 has been near the bottom of or below its target range in the 1990s. Figure 10 plots M2's position relative to the midpoint of its target range to illustrate that M2 has consistently been below the midpoint of the target range since 1991. The substantial gap between actual M2 and the midpoint of its target range stands at odds with the relatively small differences between actual base growth and base growth implied by the TVC M2 and MA M2 models in figures 8 and 9. The two forecast-based models of base growth have falsely been suggesting that base growth has been high enough to place M2 about the midpoint of its target range. Evidently, forecast errors are distorting these models of M2 targeting. To verify that forecasting models are breaking down, figure 11 shows actual growth in the M2/base ratio and growth forecasted by a time-varying coefficient model. Figure 11 shows that the forecasting model has been overpredicting the M2/base ratio since 1991 by a large amount, relative to pre-1991 prediction errors. Conse-

quently, the TVC M2 model since 1991 has been implying rates of base growth that have subsequently proved insufficient to hit the midpoint of the M2 target range.

The relationship between the monetary base and M2 has apparently undergone such rapid change that even a time varying coefficient model has not kept pace. What has happened to the relationship between the monetary base and M2? The principal factor behind recent unanticipated decreases in the M2/base ratio may be the shrinking spread between rates paid on small time and other checkable deposits. Liquid, interest-bearing checkable deposits have become more attractive as the spread has decreased. By putting funds from maturing small time deposits into other checkable deposits, savers force banks to hold more reserves for a given level of M2—hence, decreases in the M2/base ratio. Empirical models have overpredicted the M2/base ratio, largely because forecasting models had not foreseen the magnitude of the substitution out of time deposits into other checkable deposits.

Regulatory actions have also helped facilitate the flow of funds out of small time deposits in ways that statistical forecasting models could not have anticipated. For example, in the aftermath of the savings-and-loan crisis, the Resolution Trust Corporation allowed purchasers of failed thrifts to terminate small time deposits, a key M2 component, at the time of takeover, and allowed depositors at failed thrifts to withdraw their money before maturity from small time deposits without penalty. Together, these changes have contributed to lower M2/base ratios than forecasting models had foreseen.

It is also interesting to note that the break-



Figure 8  
 Quarterly Growth in Monetary Base and Growth Implied  
 by Midpoint of M2 Target Range and TVC Model Forecast  
 of M2/Base Ratio

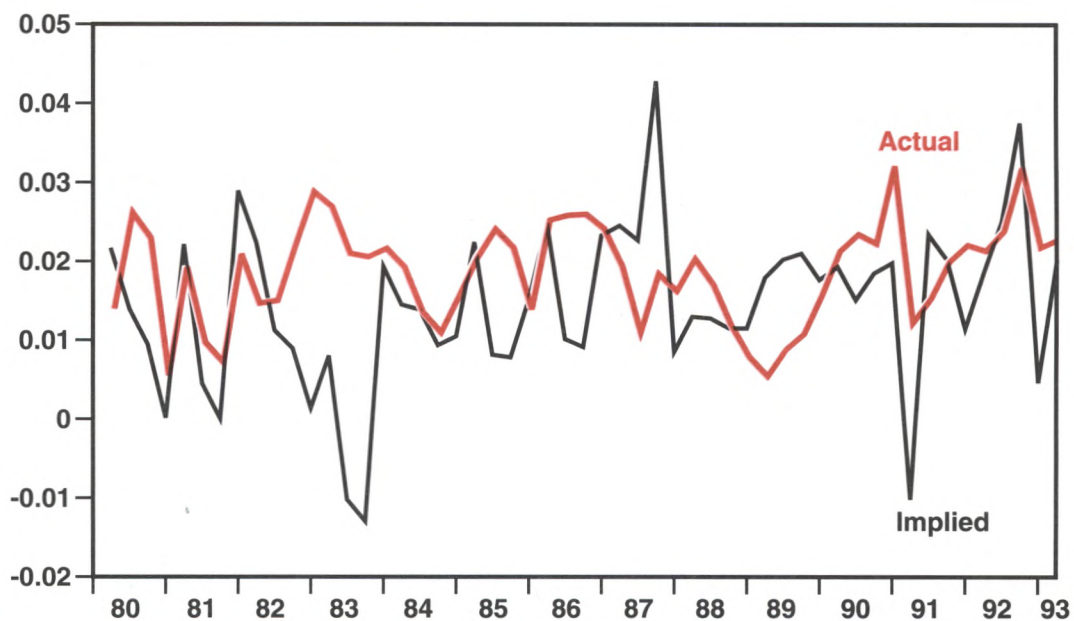


Figure 9  
 Quarterly Growth in Monetary Base and Growth Implied  
 by Midpoint of M2 Target Range and Moving-Average  
 Forecasts of M2/Base Ratio

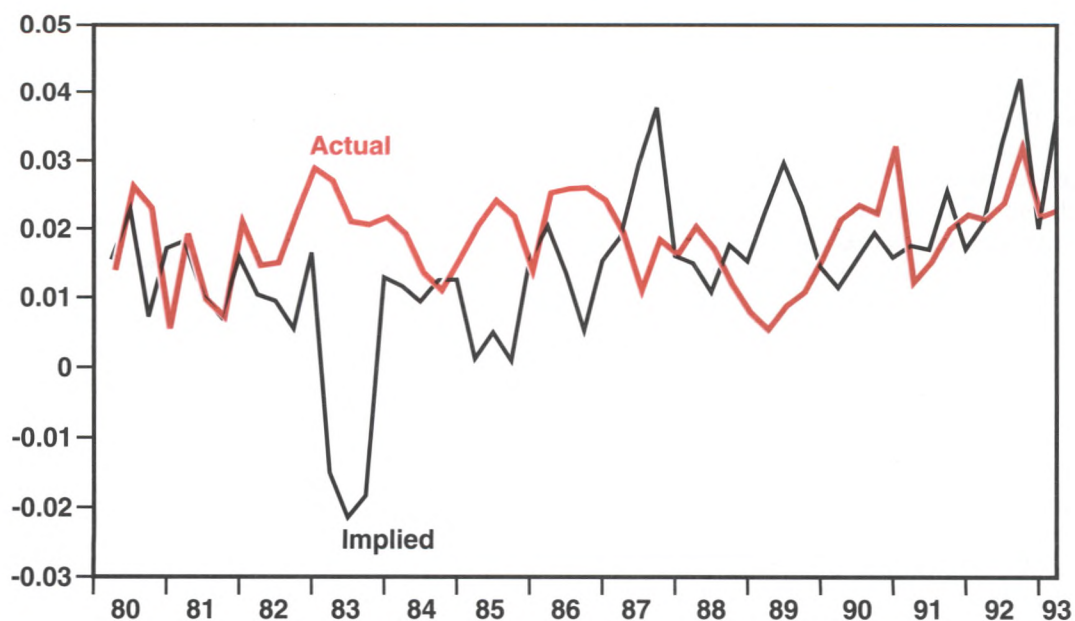




Figure 10  
**Actual M2 and Midpoint of FOMC Target Range**

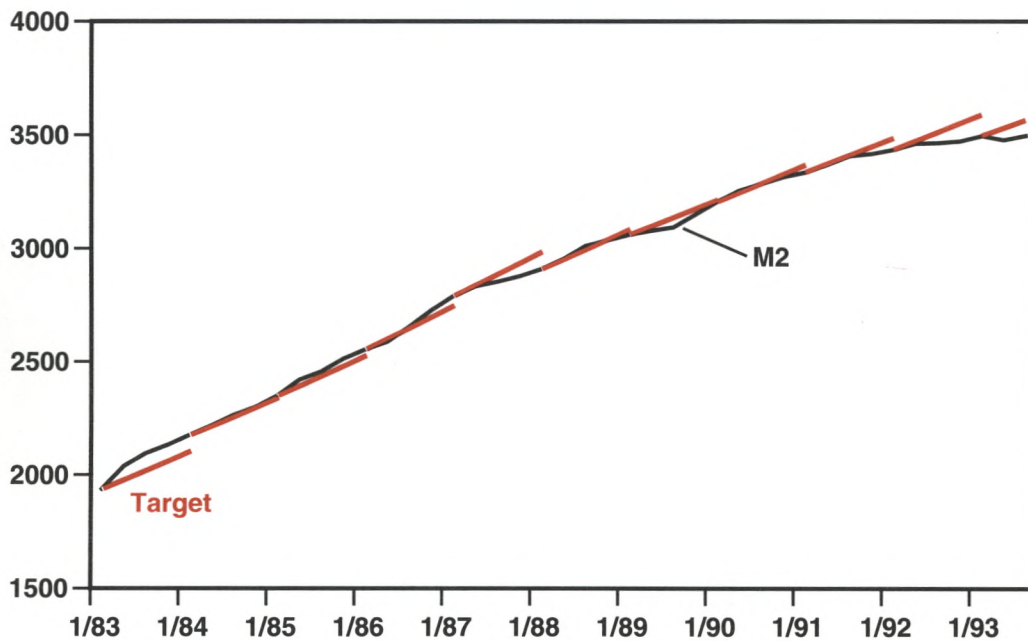


Figure 11  
**Quarterly Growth in M2/Base Ratio and Growth Forecasted by a Time-Varying Coefficient Model**

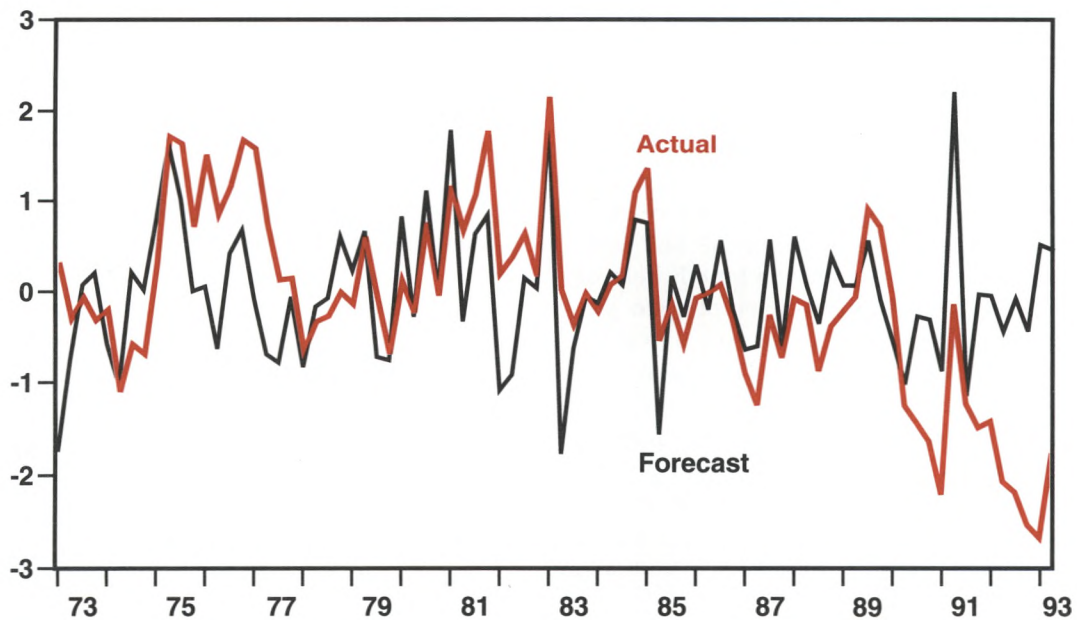
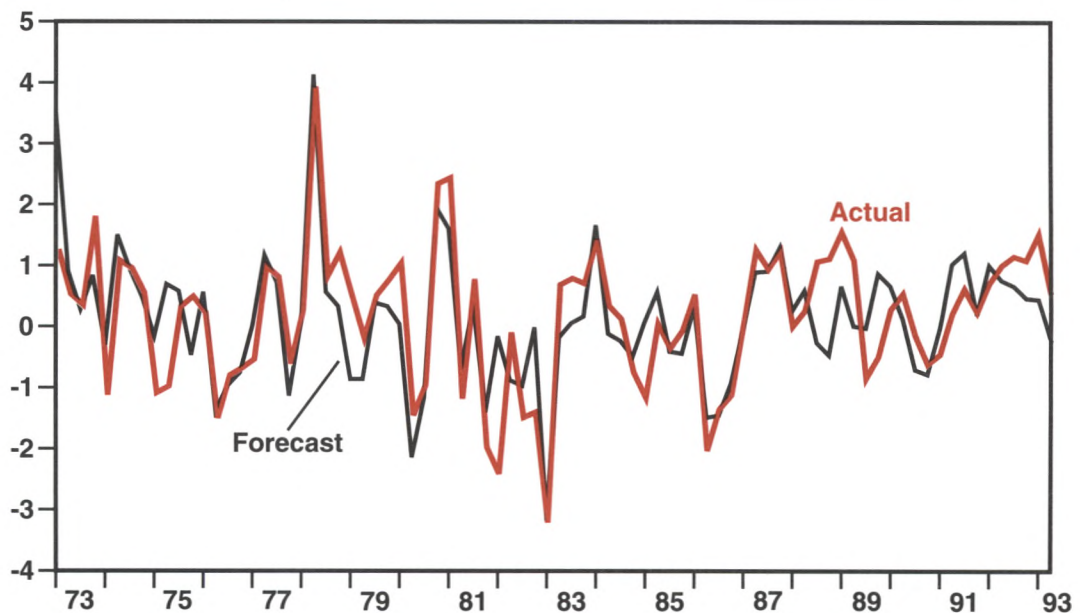




Figure 12  
**Quarterly Growth in M2 Velocity and Forecasted Growth  
 from a Time-Varying Coefficient Model**



down in the relationship between M2 and narrower aggregates, like the monetary base, is more pronounced than the much-discussed breakdown in M2 velocity. A comparison of recent forecast errors in the growth of the M2/base ratio (figure 11) and growth in M2 velocity (figure 12) shows that the M2/base ratio has suffered larger forecast errors than M2 velocity. For example, in the first quarter of 1993, the forecasting model overpredicted growth in the M2/base ratio by more than 3 percentage points for the quarter. The corresponding forecast error for growth in base velocity never approaches such a size. Apart from their relative magnitudes, errors in forecasting the M2/base ratio and M2 velocity, when combined, help explain the FOMC's decision to de-emphasize M2 as a guide to monetary policy in July 1993. First, in the current financial environment, it is difficult to predict with precision the rate of base growth needed to put M2 at the midpoint of its target range. It is also difficult to predict precisely the rate of nominal GDP growth that will accompany a given rate of M2 growth. Viewed this way, M2 has diminished value as an intermediate policy target.

As a summary, table 2 contains measures of the bias and mean-squared error between actual

and model-implied base growth, both in- and out-of-sample, for the TVC M2 and MA M2 models as percents of the corresponding measures for the rebased target GDP model. The models of M2 targeting have in-sample (1983-90), mean-squared errors that are more than an order of magnitude larger than that for the rebased target GDP model. In the out-of-sample, post-1990 period, however, the models of M2 targeting actually have lower mean-squared errors than all three GDP targeting models. Nevertheless, as discussed above, the breakdown in forecasting models of the M2/base ratio prevents the M2 targeting models from providing reliable monetary policy indicators in the 1990s.

## SUMMARY

This article studies the policy prescriptions embedded in feedback rules as monetary policy indicators. The selected feedback rules give a large role to forecasts, so recent difficulties in forecasting the relationships between various monetary aggregates and the level of nominal spending have been emphasized. The results from M2 targeting models suggest that M2 has recently lost many of the properties—specifically, predictable relationships with narrow



**Table 2**  
**Model Comparison**

Model	1983-1990		1990-1993	
	Mean-Squared Error	Bias	Mean-Squared Error	Bias
Rebased Target GDP	100%	100% ( < 0)	100%	100% ( < 0)
TVC M2	1,494%	2,759% ( > 0)	75%	72% ( > 0)
MA M2	2,391%	4,236% ( > 0)	52%	1.5% ( > 0)

Note: Expressed as a percent of the quantity for the rebased target GDP model

monetary policy instruments and stable velocity—that had made it an attractive intermediate target. Furthermore, growth in the monetary base has been consistent with growth implied by models of M2 targeting in the 1990s. The short-comings in M2 growth appear to stem from shortfalls in the M2/base ratio, relative to predicted levels.

Among models of nominal GDP targeting, the model that gradually adjusts the target path of nominal GDP for past deviations from a desired 5.7 percent annual rate of nominal GDP growth best explains base growth in terms of minimizing mean-squared error between 1983 and 1990. Furthermore, no persistent divergence has appeared in the post-1990, out-of-sample period between actual nominal GDP and the level implied by the rebased target GDP model. Nevertheless, it is too early to tell whether monetary policy will remain as consistent with that implied by the rebased target model as it was in the 1980s.

One attractive feature of the models of nominal GDP targeting is that they provide an estimate of the desired long-run rate of nominal GDP growth. From this rate, it is straightforward to calculate an approximate long-run inflation objective by subtracting an estimate of the rate of growth of potential real GDP. The resulting estimate of the implicit long-run inflation objective should be as credible as the assumptions behind the policy model. Furthermore, because one of the assumptions is that the Fed's long-run inflation objective remains constant, one can use the nominal GDP targeting models to search for possible shifts in that objective.

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## Appendix

### The Time-Varying Coefficient Model

Let  $V$  stand for either the income velocity of the monetary base or the ratio between M2 and the base,  $TB3$  for the three-month T-bill rate and  $MB$  for the monetary base. The model generating the short-run forecasts is

$$(A1) \quad \Delta \ln V_t = \beta_{0t} + \beta_{1t} \Delta TB3_{t-1} + \beta_{2t} \Delta \ln MB_{t-1} + e_t$$

$$e_t \sim \text{Normal}(0, h_t)$$

$$h_t = \sigma_0^2 + (\sigma_1^2 - \sigma_0^2) S_t$$

$$S_t \in \{0, 1\}$$

$$\sigma_1^2 > \sigma_0^2$$

$$\text{Probability}(S_t = 1 | S_{t-1} = 1) = p$$

$$\text{Probability}(S_t = 0 | S_{t-1} = 0) = q.$$

The errors in equation (A1),  $e_t$ , have time-varying volatilities in that their variance is assumed to switch between a low and high level according to a first-order Markov process.<sup>1</sup>

With time-varying coefficients, equation (A1) will be estimated using the Kalman filter under the assumption that the state variables,  $\beta_t$ , follow random walks:<sup>2</sup>

$$(A2) \quad \beta_t = \beta_{t-1} + v_t$$

$$v_t \sim \text{Normal}(0, Q)$$

In a short-run forecasting context, the assumption that the coefficients follow random walks suggests that people need new informa-

tion before changing their views about the relationships among variables. This is essentially why Engle and Watson (1985) advocate that time-varying coefficients should have unit roots. The innovations to the coefficients,  $v_t$ , are assumed to be uncorrelated, so the covariance matrix  $Q$  is diagonal. Kim (forthcoming) discusses the specific form the Kalman filtering takes for this model and the evaluation of the likelihood function, which is maximized with respect to

$$(\sigma_0^2, \sigma_1^2, p, q, Q), \text{ where } Q_{ii} = \sigma_{v_i}^2, i = 1, 2, 3.$$

By construction, this model allows for two sources of forecast error: error in predicting the value of the coefficients and the heteroscedastic random disturbance. In general, in a model with time-varying coefficients,

$$(A3) \quad y_t = X'_{t-1} \beta_t + e_t;$$

the one-step-ahead forecasts are

$$(A4) \quad y_{t|t-1} = X'_{t-1} \beta_{t|t-1}.$$

The forecast errors have two components which equal  $X'_{t-1}(\beta_t - \beta_{t|t-1}) + e_t$ . If the variance of  $(\beta_t - \beta_{t|t-1}) = R_{t|t-1}$  and  $\text{var}(e_t) = \sigma_e^2$ , the one-step-ahead, forecast-error variance is

$$(A5) \quad H_t = H_{1t} + H_{2t} = X'_{t-1} R_{t|t-1} X_{t-1} + \sigma_e^2$$

The first component ( $H_{1t}$ ) is called the variance due to time-varying parameters (TVP); the second ( $H_{2t}$ ) is simply the variance of the random

<sup>1</sup>The combination of time-varying parameters and this type of heteroscedasticity was introduced by Kim (forthcoming). Kim also illustrates that this model of heteroscedasticity is quite similar in practice to the well-known autoregressive conditional heteroscedastic (ARCH) model of Engle (1982). Basically, the Markov model tries to match the persistence of periods of high and low volatility in the data, where persistence of high and low volatility states is increasing in  $p$  and  $q$ , respectively.

<sup>2</sup>Bomhoff (1991) and Hein and Veugelers (1983) also use the Kalman filter to forecast velocity. Bomhoff holds the interest elasticity ( $\beta_{1t}$ ) constant and restricts  $\beta_{2t}$  to equal zero, so past money growth is not included in his forecasts. Hein and Veugelers restrict both  $\beta_{1t}$  and  $\beta_{2t}$  to equal zero, further restricting the information set used for forecasting.



disturbance  $e$ . Inferences about the relative sizes of the two sources of forecast error variance play an important role in updating the coefficients. One can write the forecast  $y_{t+1/t}$  as

$$(A6) \quad y_{t+1/t} = X_t' \beta_{t/t-1} + Z_t \eta_{t/t-1}$$

where  $X_t$  are the explanatory variables,  $\eta_{t/t-1}$  last period's forecast error (and therefore is the new information available), and  $Z_t$  is proportional to

$$\frac{H_{1t}}{H_{1t} + H_{2t}}$$

If  $H_{2t}$  is large relative to  $H_{1t}$ , observers would attribute less of a forecast error to a change in coefficients; instead, they would believe that it was probably an outlier. A large value of  $H_{2t}$  then implies that last period's forecast error would play a relatively small role in determining next period's forecast.







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# ***The Vulnerability of Pegged Exchange Rates: The British Pound in the ERM***

**B**ETWEEN SEPTEMBER 1992 and August 1993, the European Monetary System (EMS) went through the most serious crisis since its start in 1979. Member countries cross-pegging their exchange rates in the framework of the Exchange Rate Mechanism (ERM) were confronted with a string of speculative currency attacks. Associated with these attacks were five realignments and the suspension of two major currencies—the Italian lira and the British pound—from the ERM. The situation eased off only when the fluctuation margins were widened considerably in August 1993.

There are two reasons to review these events. First, there had been no genuine realignment in the EMS for more than five years. The EMS had widely come to be seen as a model for a viable pegged exchange rate system. Second, most of the recent cases of speculative currency attacks occurred in developing countries, where access to foreign exchange reserves is rather limited and capital controls usually play an important role in maintaining pegged exchange rates.<sup>1</sup> Hence, the near-collapse of the ERM provides a useful example of a speculative attack under

conditions of easy access to foreign exchange reserves and free capital mobility.

This article concentrates on the British episode in the EMS crisis. Since the United Kingdom's participation in the ERM was suspended in September 1992, only the early phase of the crisis is covered. First, I describe a brief history of the pound in the EMS. Next, I have selected macroeconomic indicators on the eve of the crisis to provide a picture of the economic situation and the credibility of the exchange rate band as perceived by the markets. Then, I discuss the main features of the speculative attack on the pound against the background of the basic model of balance-of-payments crisis. To this end, I introduce the model originated by Krugman (1979), along with extensions motivated by the British situation.

## **BRITAIN'S PARTICIPATION in the ERM<sup>2</sup>**

When the EMS started operating on March 8, 1979, Britain did not participate in the central

<sup>1</sup>See Edwards (1989) for a detailed analysis of devaluations in developing countries.

<sup>2</sup>There is a vast literature on the EMS. Ungerer, et al. (1983, 1986, 1990) provide accessible reviews of EMS developments. Also see Fratianni and von Hagen (1992), Giavazzi and Giovannini (1989), and Gros and Thygesen (1992) for more advanced discussions.



piece of the new system, the ERM.<sup>3</sup> In the view of British monetary authorities, the loss of room for maneuvering under a system of pegged exchange rates outweighed probable gains. Many observers did not give the ERM much credit either. Some predicted an inflationary bias, while others expected the system to be drawn apart soon by the widely differing inflation rates among participating countries. In the event, the ERM performed surprisingly well. Inflation rates decreased substantially (albeit not more than in non-ERM countries), and the variability of nominal and real effective exchange rates fell a great deal.

Certainly, many realignments were required for the ERM to survive during its early years. The 17 realignments witnessed in the period 1979-93 are summarized in Table 1.<sup>4</sup> Two features stand out. First, the deutsche mark never was devalued against other ERM currencies. Second, realignments became less frequent until 1992, reflecting the decline in intra-ERM inflation rate differentials.<sup>5</sup>

Capital controls also played a role in the survival of the ERM. They had intensified in the final years of the Bretton Woods System and many European countries continued to use them after that. It was not until 1988 that an EC directive stipulated the complete liberalization of capital movements. For most member countries, this was accomplished by mid-1990 (extensions were granted for Greece, Ireland, Portugal and Spain).

Britain chose a different way. Rather than participate in the ERM when it began in 1979, Britain decided to pursue a deliberately tight monetary policy based on a free float and

growth targets for monetary aggregates. Capital controls were removed rapidly and fiscal policy was oriented toward balancing the budget.<sup>6</sup> This strategy resulted in a large reduction of inflation (from 18 percent in 1980 to less than 5 percent in 1983), albeit at the price of substantial output losses. A complicating factor was the increasingly unstable relationship between the targeted monetary aggregate (sterling M3) and nominal income.<sup>7</sup> This made sterling M3 a questionable indicator, which risked a reduction in the credibility of monetary policy. In response, monetary authorities tried several alternatives. First, several aggregates were targeted simultaneously. Then, the emphasis shifted to narrow monetary aggregates. Finally, in 1987-88, the free float was replaced by a managed exchange rate shadowing the deutsche mark.

In retrospect, the mark exchange rate targeting of 1987-88 was an ill-fated attempt at finding a stable nominal anchor. Initially, monetary policy loosened due to the determination of the government to stick with the unofficial target exchange rate of 3 marks per pound. As a result, the economy overheated and forced monetary authorities to tighten the policy stance and to let the pound appreciate.<sup>8</sup>

Despite this troubled experience with an exchange-rate oriented policy, ERM membership remained an option favored by the chancellor of the exchequer, Nigel Lawson, and supported by leading businesspeople. In June 1989, at the EC summit in Madrid, the government set the terms for Britain's entry to the ERM. These terms were: British inflation close to the EC average; real progress towards completion of

<sup>3</sup>The EMS includes all members of the European Community (EC). The ERM originally included only Belgium-Luxembourg, Denmark, Germany, France, Ireland, Italy and the Netherlands. Portugal, Spain and the United Kingdom joined in April 1992, January 1990, and October 1990, respectively. Italy and the United Kingdom suspended their participation in the ERM in September 1992. Greece has never participated in the ERM.

<sup>4</sup>It may be argued that there were only 16 genuine realignments. On January 8, 1990, when the Italian lira switched from  $\pm 6$  percent to  $\pm 2.25$  percent fluctuation margins, the central rate was devalued relative to the current market rate. The new lower intervention margins were not below the old margins, however, except for the Spanish peseta exchange rate of the lira.

<sup>5</sup>Giavazzi and Giovannini, among many others, argue that the EMS became a greater deutsche mark area by 1983; Germany is the center country, and countries such as Italy and France peg their currencies to the mark. See Fratianni and von Hagen for qualifications of this view.

<sup>6</sup>A chronological account of British economic policy is provided by the annual surveys on the United Kingdom published by the Organization for Economic Cooperation and Development (OECD).

<sup>7</sup>Sterling M3 is M3 less residents' deposits abroad.

<sup>8</sup>See Belongia and Chrystal (1990) for a critical discussion of this episode.



Table 1

**EMS Realignments: Percentage Changes in Bilateral Central Rates<sup>1</sup>**

Date	BLF	DKR	DM	PTA	FF	IRL	LIT	HFL	ESC	UKL
September 24, 1979		-2.9	2.0	*					*	*
November 30, 1979		-4.8		*					*	*
March 23, 1981				*			-6.0		*	*
October 5, 1981			5.5	*	-3.0		-3.0	5.5	*	*
February 22, 1982	-8.5	-3.0		*					*	*
June 14, 1982			4.25	*	-5.75		-2.75	4.25	*	*
March 21, 1983	1.5	2.5	5.5	*	-2.5	-3.5	-2.5	3.5	*	*
July 22, 1985	2.0	2.0	2.0	*	2.0	2.0	-6.0	2.0	*	*
April 7, 1986	1.0	1.0	3.0	*	-3.0			3.0	*	*
August 4, 1986				*		-8.0			*	*
January 12, 1987	2.0		3.0	*				3.0	*	*
January 8, 1990							-3.7			*
September 14, 1992							-7.0			*
September 17, 1992				-5.0			*			*
November 23, 1992				-6.0			*		-6.0	*
February 1, 1993						-10.0	*			*
May 13, 1993				-8.0			*		-8.0	*

<sup>1</sup>Calculated as the percentage change against the group of currencies whose bilateral parities remained unchanged in the realignment, except for the two realignments in which all currencies were realigned. Notation: BLF = Belgian franc; DKR = Danish krone; DM = Deutsche mark; PTA = Spanish peseta; FF = French franc; IRL = Irish pound; LIT = Italian lira; HFL = Netherlands guilder; ESC = Portugese escudos; UKL = British pound. Star (\*) indicates that the currency was not in the ERM at this date.

SOURCES: Ungerer, et. al. (1990) and Commission of the European Communities.

the single European market; financial-market liberalization; end of exchange controls; and strengthened competition policy in the EC.<sup>9</sup> When Britain actually joined the ERM 15 months later, all conditions except inflation convergence were virtually met.<sup>10</sup>

### **Britain Enters the ERM**

Britain entered the ERM on October 8, 1990, with fluctuation margins of  $\pm 6$  percent around bilateral central rates, instead of the usual  $\pm 2.25$  percent.<sup>11</sup> As with Italy and Spain before, and Portugal later, the ERM allowed wider margins to provide the newcomer some flexibility to adjust. By joining the ERM, Britain committed itself

to keeping the exchange rate within these margins. Essentially, two instruments were available to this end: interest rate policies and direct interventions on the foreign exchange market.<sup>12</sup>

Consider a case where the pound approaches the lower margin of its deutsche mark band. The Bank of England can sell foreign currency or it may raise short-term interest rates to prevent the pound from depreciating further. To finance the intervention, it may either draw on its own reserves or borrow from other sources (international capital markets, central banks). In the ERM, access to foreign exchange reserves is facilitated by the Very Short-Term Financing Facility (VSTF). Under the VSTF, the Bank of

<sup>9</sup>See OECD(1989/1990), p. 40.

<sup>10</sup>There may have been short-term reasons to speed up Britain's entry in the second half of 1990. With the inter-governmental conference on monetary union scheduled for December 1990, Britain knew that it had to be part of the ERM if it wished to influence the path of monetary integration in the EC. Furthermore, a general election was approaching, and the government could expect ERM membership to provide some "honeymoon" effect by allowing pound interest rates to fall without jeopardizing the exchange rate.

<sup>11</sup>The effective margins were approximately  $-2.22$  percent and  $+2.28$  percent for the narrow (4.5 percent) bands, and  $-5.82$  percent and  $+6.18$  percent for the wide (12 percent) bands. Margins of about  $\pm 2.25$  percent and  $\pm 6$  percent would violate the condition that central bank A's compulsory buying rate for currency B must be the same as central bank B's compulsory selling rate for currency A.

<sup>12</sup>In Britain, changes in the policy stance are typically signaled by changes in short-term interest rates. See Batten et al. (1990) for a discussion of the operating procedures.



England is allowed to borrow marks from the Bundesbank virtually without limits. The Bundesbank is obliged to grant such credits upon request.<sup>13</sup>

After Britain joined the ERM, the pound moved most of the time comfortably in the  $\pm 6$  percent band around its central rate. After a temporary appreciation, the pound stayed for more than one year in an implicit narrower band in the neighborhood of  $\pm 2.25$  percent around central parity. Pressure on the pound usually was short-lived and quickly reversed by either a slight increase in domestic interest rates or modest interventions in the foreign exchange market. Interest rates were raised temporarily when Margaret Thatcher stepped down as prime minister in November 1990 and in the weeks before the general election of April 1992, when opinion polls pointed to a victory for the opposition Labour party. On the whole, however, interest rates (as well as inflation) decreased substantially during the period Britain participated in the ERM.

### ***Tensions in the ERM***

The tensions in the foreign exchange markets that finally led to the near-collapse of the ERM in September 1992 were triggered by doubts about the progress toward monetary union.<sup>14</sup> In June 1992, the Danes had voted no in a referendum on the Maastricht Treaty, which included a chapter on European Monetary Union (EMU). Moreover, the outcome of the French referendum on the treaty in September was expected to be close. Since the prospect of monetary union had provided an anchor for expectations, the outlook for the current parities in the ERM looked rather bleak if France rejected the treaty also. For reasons discussed below, pressure on the exchange rate became most

notable first in Italy, where the discount rate was raised over the summer of 1992 in several steps, from 12 percent to 15 percent. The pound felt some pressure too, and British monetary authorities began to step up interventions on the foreign exchange market in late August. On September 3, 1992, Britain announced a program to borrow ECU 10 billion, about \$14.3 billion (U.S.) at the time, in the international market to increase foreign exchange reserves.

Ultimately, the rise in domestic interest rates did not save the Italian lira. On September 13, the lira's central rate was devalued by 7 percent. Two days later, Germany slightly eased monetary policy. The discount rate was lowered by 50 basis points to 8.25 percent and the Lombard rate was lowered by 25 basis points to 9.5 percent. These adjustments—the first German interest rate cuts in nearly five years—were perceived as unexpectedly small by the markets, and comments attributed to the Bundesbank president, who appeared to question the adequacy of the pound's central rate (subsequently denied), raised tensions further.<sup>15</sup>

### ***Britain Withdraws from the ERM***

On September 16—Black Wednesday—the Bank of England intervened massively on the foreign exchange market to prevent the pound from falling below the lower margin of its Deutsche mark band. Furthermore, it raised the base lending rate from 10 to 12 percent and announced later in the day a further rise to 15 percent, to be effective the following morning. These measures did not succeed in relieving the pressure on the pound. In the evening, British monetary authorities announced the temporary suspension of the pound from the ERM. It seemed hardly feasible to fix a new parity less

<sup>13</sup>Even if access to the VSTF is said to be unlimited, this is not literally true. The Bundesbank has two reasons to make sure that the VSTF is not overburdened. First, it bears an exchange rate risk since the credits are denominated in European Currency Unit (ECU), a basket currency defined by fixed quantities of member currencies. So, if the pound depreciates relative to the mark, the Bundesbank will be repaid the value of depreciated ECU. Second, the selling of the mark during interventions raises Germany's monetary base and would jeopardize its inflation objective unless the Bundesbank is able to sterilize the intervention. Therefore, the Bundesbank insisted right from the start of the ERM on an opt-out clause. According to *Central Banking* (1992; Robert Pringle, ed.), this clause was confirmed in a letter to the German government by the then-president of the bank, Otmar Emminger.

<sup>14</sup>For a detailed account of the events prior to Britain's withdrawal from the ERM, see *Bank of England Quarterly Bulletin* (November 1992).

<sup>15</sup>See *Financial Times*, September 15, 1992, and September 16, 1992, respectively. As is now known, the Bundesbank actually did suggest a trade—with the size of German interest cuts depending on the size of the realignment—to the chairman of the EC Monetary Committee. Since the Italian lira finally was the only currency devalued on September 13, German interest rate cuts consequently were small; see *Financial Times*, December 11, 1992, for a detailed account.



than a week before the French referendum on the Maastricht Treaty. The next day, the base lending rate was moved back to 10 percent. At the same time, Italy announced the lira's temporary withdrawal from the ERM, while Spain devalued its currency by 5 percent and imposed temporary capital controls.

The floating of the pound marks the end of Britain's ERM episode. In the following weeks, when the markets did not calm down after the French had narrowly approved the Maastricht Treaty, it became clear that Britain and Italy would not rejoin quickly. The ERM struggled on for another 10 months. Then, on August 2, 1993, EC member states decided to raise the margins of the exchange rate bands to  $\pm 15$  percent around the central parities, an action coming close to a suspension of the system. The old margins continued to be valid only for the deutsche mark/Dutch guilder exchange rate.

In retrospect, the distinctive feature of Britain's defense of the pound was the almost complete lack of interest rate policies. Domestic interest rates were raised only on the final day of the crisis and the size of this rise was rather small. Most other weak-currency countries in the 1992-93 crisis of the EMS raised their short-term interest rates more aggressively.<sup>16</sup> As indicated above, however, this did not provide them durable relief from speculative attacks.

## **ECONOMIC INDICATORS PRIOR TO BRITAIN'S WITHDRAWAL FROM THE ERM**

When Britain participated in the ERM, British monetary authorities regularly emphasized their commitment to the established exchange rate parities. It is not enough to make such a pledge, however. The market has to be convinced that monetary authorities have no incentive to drop their commitment and that they will take whatever action is necessary to defend the pari-

ties. This, of course, turns out to be difficult. The market knows that pegging the exchange rate ultimately is a conditional commitment. Expectations are formed that monetary authorities will realign if the perceived cost of defending the exchange rate is larger than the perceived cost of a realignment. This section takes a look at selected macroeconomic indicators and asks whether the exchange rate target bands were perceived as credible by the markets.

## **General Economic Conditions**

Table 2 shows macroeconomic indicators on the eve of the crisis for all countries participating in the ERM (except Portugal, because of data limitations). The countries are ordered in terms of their relative size (measured by GDP). Indicators refer to August 1992 for monthly data and the second quarter of 1992 for quarterly data. Annual figures are OECD forecasts for 1992, published in June of the same year. The indicators can roughly be divided into three groups: monetary indicators (money supply growth, short-term interest rate, long-term interest rate); fiscal indicators (primary deficit/GDP ratio, debt/GDP ratio); and indicators describing final goals (output growth, inflation).<sup>17</sup>

These indicators shed some light on the divergent economic forces in the ERM. The most important single event hitting the EC during recent years has been German unification. Basic economic theory suggests that the German unification would lead to an increase in that country's aggregate demand and a real appreciation of the mark (where the real appreciation is equal to the nominal appreciation adjusted by the inflation rate differential against foreign countries). These effects were heightened by the decision to finance higher public spending by borrowing rather than by raising taxes.<sup>18</sup> Under pegged exchange rates, the real appreciation of the mark is brought about by a positive inflation differential between Germany and the other ERM member countries. Since the Bundesbank was

<sup>16</sup>See Goldstein et al. (1993), Annex VI and the statistical appendix in particular.

<sup>17</sup>Four out of the seven indicators closely correspond to the macroeconomic convergence criteria for EMU mentioned in the Maastricht Treaty. These criteria are: (1) the inflation rate of the country under review must not exceed the average of the three EC countries with the lowest inflation rate by more than 1.5 percent; (2) the interest rate on long-term government securities must not be more than 2 percentage points higher than the average rate of the same three countries; (3) the budget deficit must not exceed 3 percent

of GDP; and (4) the public debt/GDP ratio must not exceed 60 percent. Note, however, that table 2 uses the primary deficit (i.e. the budget deficit net of interest payments) to indicate whether the evolution of the fiscal indicators goes in the direction required by the EMU criteria.

<sup>18</sup>These are short-run effects. In the long run, an expansionary fiscal policy that permanently raises the debt/GDP ratio will cause the real exchange rate to fall, since the country must export more to offset the effects of the decline in its net external asset position.



**Table 2**  
**Macroeconomic Indicators on the Eve of the September 1992 Crisis**  
**(in percent)**

Countries	GDP shares <sup>1</sup>	Money growth <sup>2</sup>	Short-term interest rates <sup>3</sup>	Long-term interest rates <sup>4</sup>	General government primary balance/GDP <sup>5</sup>	Gross government debt/GDP <sup>5</sup>	Consumer price inflation <sup>6</sup>	GDP growth <sup>5</sup>
Germany	25.7	7.1	9.7	8.4	-1.3 <sup>7</sup>	43.5 <sup>7</sup>	3.5	1.3
France	19.5	-1.6	10.0	9.0	0.3	48.5	2.0	2.0
Italy	18.8	10.9	15.3	12.5	-0.9	107.8	5.0	1.5
United Kingdom	16.6	4.5	9.6	9.1	-2.9	38.5	3.6	0.4
Spain	8.6	11.0	13.0	12.7	-1.6	48.0	5.8	2.6
Netherlands	4.7	3.6	9.8	8.3	1.5	79.9	3.5	1.2
Belgium	3.3	N.A.	9.8	9.1	4.2	132.9	2.1	1.6
Denmark	2.1	10.9	11.5	10.4	1.1	61.6	2.2	2.1
Ireland	0.7	-5.6	10.6	9.1	5.1 <sup>7</sup>	108.8 <sup>7</sup>	3.7	2.4 <sup>7</sup>
All countries <sup>8</sup>	100.0	—	11.1	9.8	-0.8	61.6	3.6	1.5

<sup>1</sup>1991; International Financial Statistics (*IFS*), line 99 (b, b.c)

<sup>2</sup>Second quarter 1992; percentage changes from the same period a year earlier; *IFS*, line 34

<sup>3</sup>August 1992; *IFS*, line 60b

<sup>4</sup>August 1992; *IFS*, line 61 (except *IFS* line 61b for Italy)

<sup>5</sup>Projections for 1992; *OECD Economic Outlook* (June 1992)

<sup>6</sup>August 1992; percentage changes from the same period a year earlier; *IFS*, line 64

<sup>7</sup>GNP

<sup>8</sup>Average weighted by GDP shares

determined to keep inflation low and to let short-term interest rates rise, the required real appreciation of the mark could come only by a substantial reduction in inflation in the other countries.

So, Germany's economic policy on the eve of Britain's crisis was characterized by a slightly loose fiscal policy (reflected in the primary deficit) and a tight monetary policy (at least as reflected in short-term interest rates of nearly 10 percent, substantially higher than the inflation rates). Despite slow output growth in Germany, the chances of German interest rate cuts seemed bleak. The growth of the German money supply still was above the target range and the inflation rate—running at 3.5 percent and accelerating—was considered too high.

What were the specific problems of Britain, Italy and Spain, the three large EC countries forced to adjust their currencies in September 1992? Table 2 indicates that a deficit in the primary balance was expected for Britain and Italy. This was much more troublesome for Italy, since Britain's debt/GDP ratio was low, while Italy actually had to realize substantial surpluses

to reduce its large debt/GDP ratio in view of EMU. Britain was in an even better position with regard to inflation. Italy and Spain clearly had an inflation problem reflected in both inflation rates and long-term interest rates. Despite some success in bringing inflation rates down from double-digit levels, there was still a substantial gap compared with the other ERM countries.

Britain, on the other hand, had inflation and long-term interest rates below the average of the ERM countries. Britain's main problem was relatively slow growth. The OECD's forecasts for GDP growth in 1992 had Britain at the bottom of the EC countries. Starting in 1990, the British recession had been particularly stubborn, and hopes for an economic recovery had been disappointed repeatedly. As a result, it was difficult not only to accept the current interest rate level imposed by Germany, but also to convince the market that domestic interest rates would be raised even further should the pound come under pressure.

No attempt is made in table 2 to weigh the various indicators to calculate an overall weighted-average indicator for each country.



A review of EMS realignments since 1979, however, indicates that the chief cause for a devaluation was probably a persistent inflation differential, leading to an overvaluation of the currency. Such an overvaluation often was built up over an extended period of time. Therefore, a better indicator than an annual performance measure is the cumulated rate of change of the real exchange rate over the period starting with the date when the current parities were established.

### **Movements in the Real Exchange Rates**

Figure 1 shows the real mark/pound exchange rate when Britain participated in the ERM. Nominal exchange rates, the margins of the exchange rate band, and cost or price differentials are given for convenience. There are various ways to calculate real exchange rates. Here, two indexes were calculated. The first is based on unit labor cost, and the second on consumer prices.<sup>19</sup> Note that unit labor cost data are quarterly (ending in the second quarter of 1992), while consumer price data are monthly (ending in August 1992). Hence, the top graph of figure 1 (quarterly data) does not have the pound falling to the lower margin at the very end of the period. Both indexes show that cumulated inflation differentials were very small on the eve of the collapse (0.05 percent for consumer prices and 1.4 percent for unit labor cost). Since the nominal exchange rate of the pound depreciated inside the band, both measures of the real exchange rate indicate that the mark price of the pound was lower in real terms compared to its entry level.

Figures 2-4 repeat this exercise for France, Italy and Spain, the three other, major, non-German countries participating in the ERM. Only the real exchange rates based on consumer prices are shown. The starting dates differ according to the preceding realignment (January

1987 for both the French franc and the Italian lira) or the entry to the ERM (January 1990 for Spain).<sup>20</sup> The figures exhibit substantial real appreciation for both the Italian lira and (to a lesser extent) the Spanish peseta. The franc, while appreciating in real terms during the first few years, largely retraced its rise by 1990 thanks to low inflation.

Overall, the evolution of the real exchange rate does not point to the pound (or the franc) as a candidate for a devaluation.<sup>21</sup> There was nothing like the usual pattern of an increasing overvaluation due to a persistent inflation rate differential. Still, there was the discrepancy between the cyclical needs of the British economy and the high interest rates imposed on the ERM by Germany. The next section examines the perception of the exchange rate band's credibility before the speculative currency attacks actually forced the withdrawal of the pound (and the lira) from the ERM.

### **Perceptions of Britain's Credibility in the ERM**

A simple way to assess an exchange rate band's credibility is based on uncovered interest rate parity.<sup>22</sup> Uncovered interest rate parity states that under perfect international capital mobility and risk-neutral speculation, the differential between nominal domestic and foreign interest rates is equal to the anticipated rate of depreciation of the domestic currency. So, given the current exchange rate and domestic and foreign interest rates for various maturities, the expected exchange rate for these maturities can be calculated. Then, the band is said to be credible if the expected exchange rate is within the margins of the band.<sup>23</sup>

Figure 5 shows the results for the mark/pound exchange rate when Britain participated in the ERM. The time horizons are three months, 12

<sup>19</sup>Consumer prices excluding mortgage rates are used for Britain in this calculation, but not in table 2. The former measure is widely seen as a better indicator of core inflation. If a tight monetary policy raises interest rates, including mortgage rates, the overall price index may actually show an acceleration of inflation, while the brakes on inflation are already in place. Britain's inflation would be lower (and the real depreciation of the pound even more pronounced) if the overall consumer price index were taken, since interest rates were falling during much of the period under review.

<sup>20</sup>Again, the realignment of January 8, 1990, caused by the switch of the Italian lira to a narrow band is ignored. See footnote 4 for explanations.

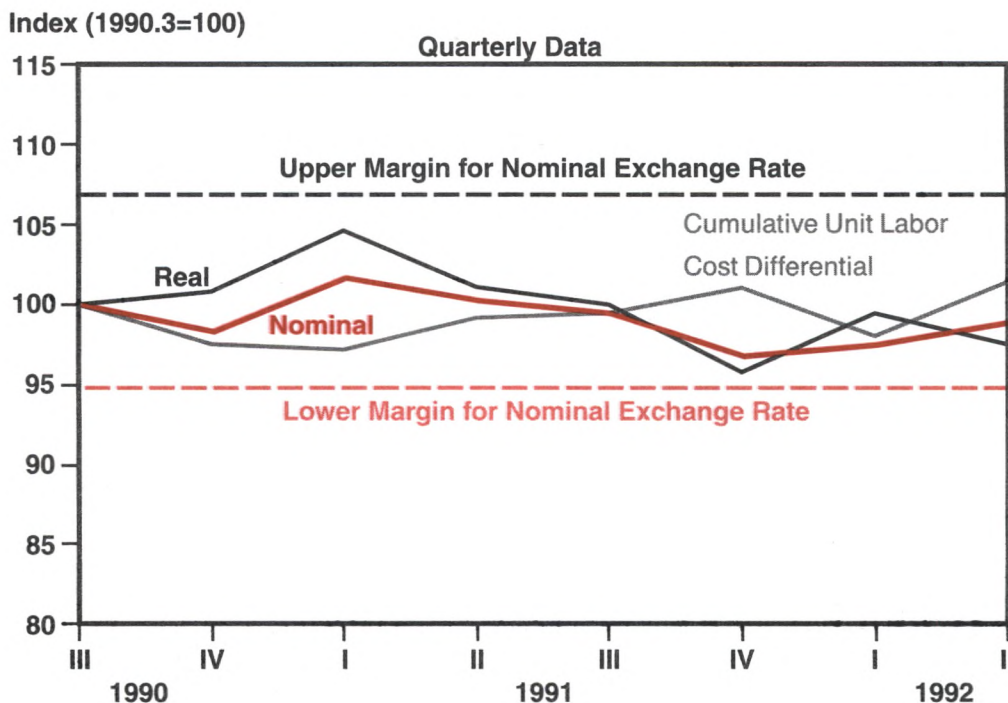
<sup>21</sup>There may have been real factors leading to a lower real mark/pound equilibrium rate, however. Also, the central parity may have been too ambitious from the beginning. Note that the real Deutsche mark/pound exchange rate was lower in October 1990 than during most of the 1980s.

<sup>22</sup>This test was originated by Svensson (1991).

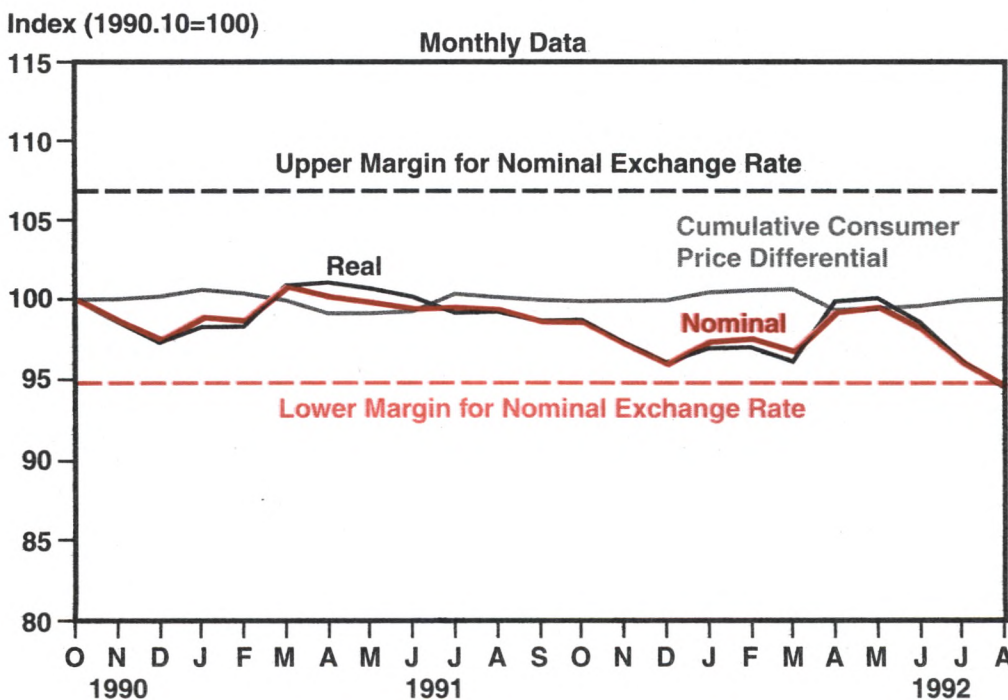
<sup>23</sup>If the assumption of risk-neutrality is dropped, a term for risk premia must be included in the interest rate parity condition. Svensson (1992) showed that these premia are very small for narrow exchange rate bands.



Figure 1  
**Nominal and Real DM/Pound Exchange Rates**



**Nominal and Real DM/Pound Exchange Rates**

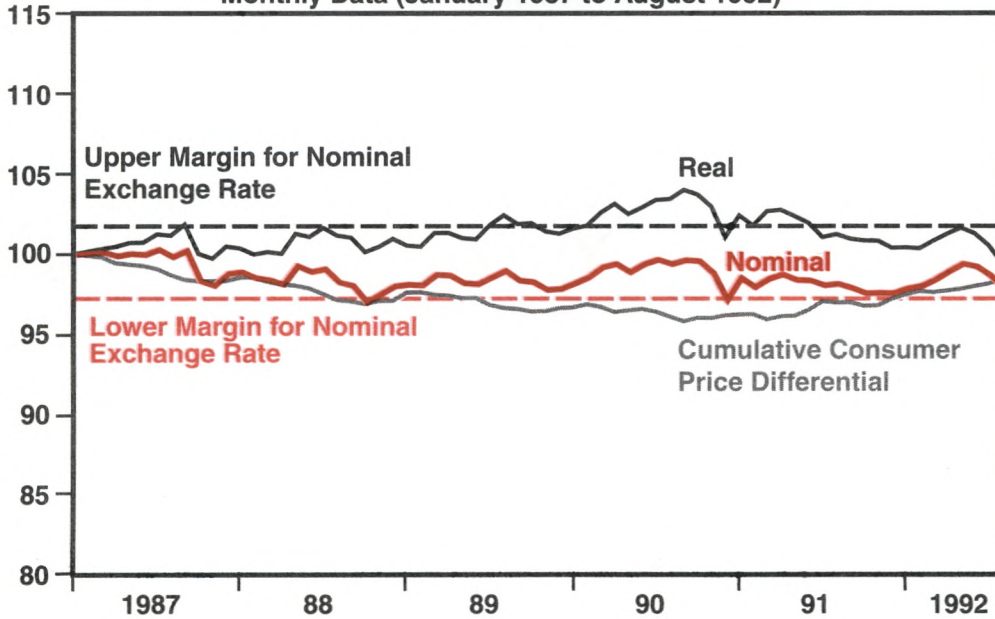




**Figure 2**  
**Nominal and Real DM/French Franc Exchange Rates**

Index (1987.01=100)

Monthly Data (January 1987 to August 1992)



**Figure 3**  
**Nominal and Real DM/Italian Lira Exchange Rates**

Index (1987.01=100)

Monthly Data (January 1987 to August 1992)

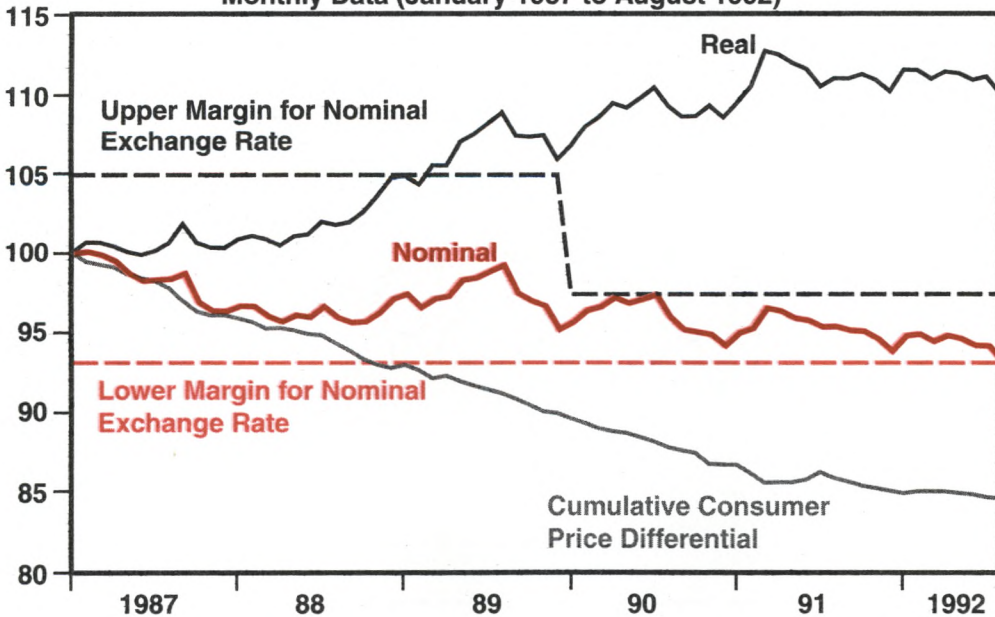




Figure 4  
Nominal and Real DM/Spanish Peseta Exchange Rates

Index (1990.01=100)

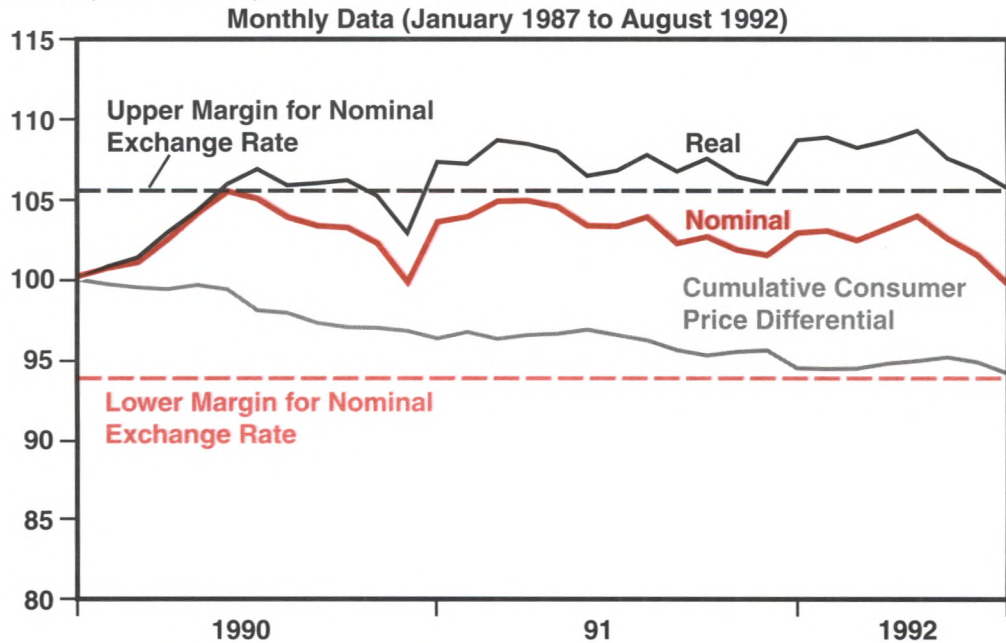
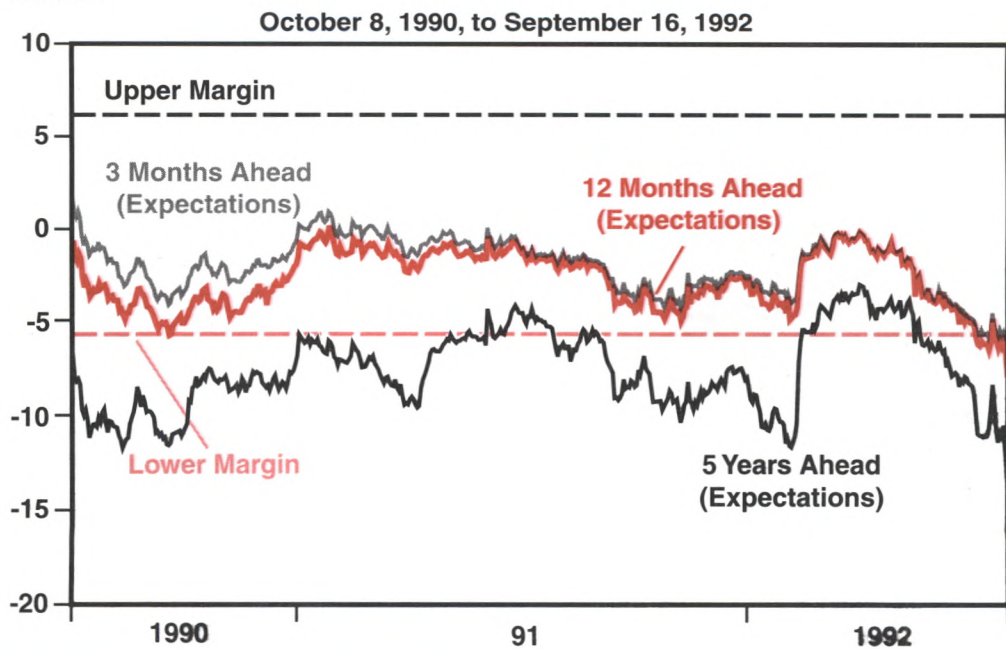


Figure 5  
DM/ Pound Exchange Rate (as Deviation from Central Rate)

Percent





months and five years, based on interest rate differentials. Interest rates for three and 12 months are Euromarket rates, guaranteeing that the deposits are comparable in every respect except currency denomination. The interest rates for five years are based on government bond yields, since no Euromarket rates are readily available for maturities of more than 12 months. The data are daily.

The results indicate that the expected exchange rate always moved within the margins of the band for maturities up to 12 months until mid-August 1992. For maturities of five years, however, the expected exchange rate most of the time was outside the margins. The latter result implies that there were some lingering doubts about the long-term credibility of the mark/pound exchange rate band. Nevertheless, a crisis was not perceived as particularly likely. Doubts about the short- or medium-term credibility of the band arose only immediately before the parity actually was attacked.

Using monthly data for 12 months, the same exercise was applied to the franc, the lira and the peseta during the periods these currencies were participating in the ERM. The results, summarized in figures 6-8, show that the credibility of the band derived for the pound cannot be generalized to apply to other EMS countries throughout the period of their participation. The expected future exchange rates of both the franc and the lira mostly were outside the margins of the bands during 1979-89. Since 1989, the expected future exchange rates of ERM currencies usually were within the margins.<sup>24</sup>

Rose and Svensson (1991) proposed a slightly more elaborate technique to assess the credibility of exchange rate bands.<sup>25</sup> They split the total rate of depreciation implied by the interest rate differential into the expected rate of depreciation within the band and the expected rate of realignment. The expected rate of depreciation

within the band (conditional upon no realignment) is estimated under the assumption of rational expectations using realized exchange rate data. The result is deducted from the interest rate differential to get the expected rate of realignment.<sup>26</sup> Rose (1993) recently used this method to calculate expected realignment rates for the mark/pound exchange rate. He shows that expectations of a pound realignment were low throughout most of 1992. The pound's credibility was not in reasonable doubt until mid-August 1992, at the earliest.

Overall, the credibility measures indicate that the successful speculative attack on the pound was not anticipated well in advance. The divergent economic forces stemming from German unification—well known for quite some time—did not result in a prompt decline in the exchange rate band's credibility. Signs of an approaching crisis were strikingly rare. To gain a broader picture of the timing and the dynamics of the speculative attack, the next section considers the basic model of a balance-of-payments crisis.

## THE ECONOMIC ANALYSIS OF A SPECULATIVE ATTACK

To clarify Britain's problem in the ERM, an outline of the basic model of speculative currency attacks that has dominated the recent literature follows. Also reviewed are some extensions motivated by the preceding discussion of the British episode. These extensions include the roles of interest rate pegging, borrowing and capital controls.<sup>27</sup>

### *Some Theoretical Considerations*

Consider a situation of a currency whose value is pegged to a foreign currency. The foreign interest rate is assumed to be constant. There is no commercial banking sector, and the supply of money is equal to the total of both

<sup>24</sup>See Frankel and Phillips (1991) for an investigation of credibility in the EMS using survey data on expected exchange rates in addition to interest rate differentials.

<sup>25</sup>See Svensson (1993) for an application on EMS data.

<sup>26</sup>It is assumed that the position of the exchange rate inside the band is the same before and after the realignment. While this makes it possible to interpret the result as the expected rate of realignment, it is somewhat at odds with the facts. After most realignments, the exchange rate jumped toward the upper margin of the band.

<sup>27</sup>The literature on speculative currency attacks starts with Krugman (1979) and Flood and Garber (1984b). Flood and Garber (1984a) and Obstfeld (1986) analyzed self-fulfilling attacks and multiple equilibria. Agénor et al. (1992) and Blackburn and Sola (1993) provide selective reviews of the fast-growing literature. For an excellent non-technical description, see Goldstein et al. (1993), Annex V.



Figure 6  
**DM/ French Franc Exchange Rate, 12 Months  
 Expectations (as Deviation from Central Rate)**

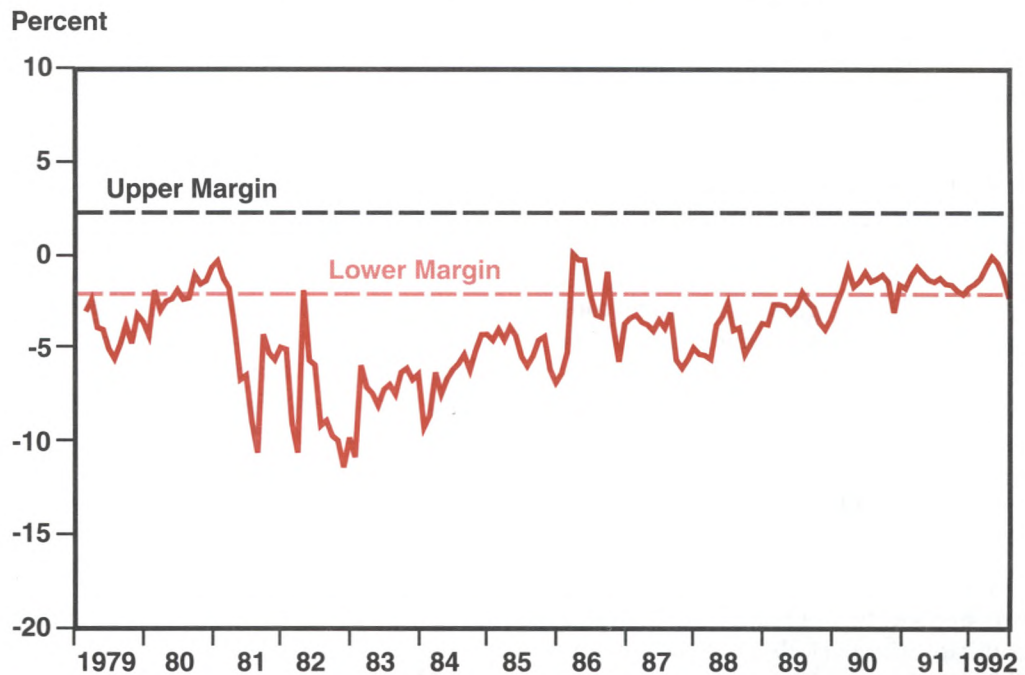


Figure 7  
**DM/ Italian Lira Exchange Rate, 12 Months Expectations  
 (as Deviation from Central Rate)**

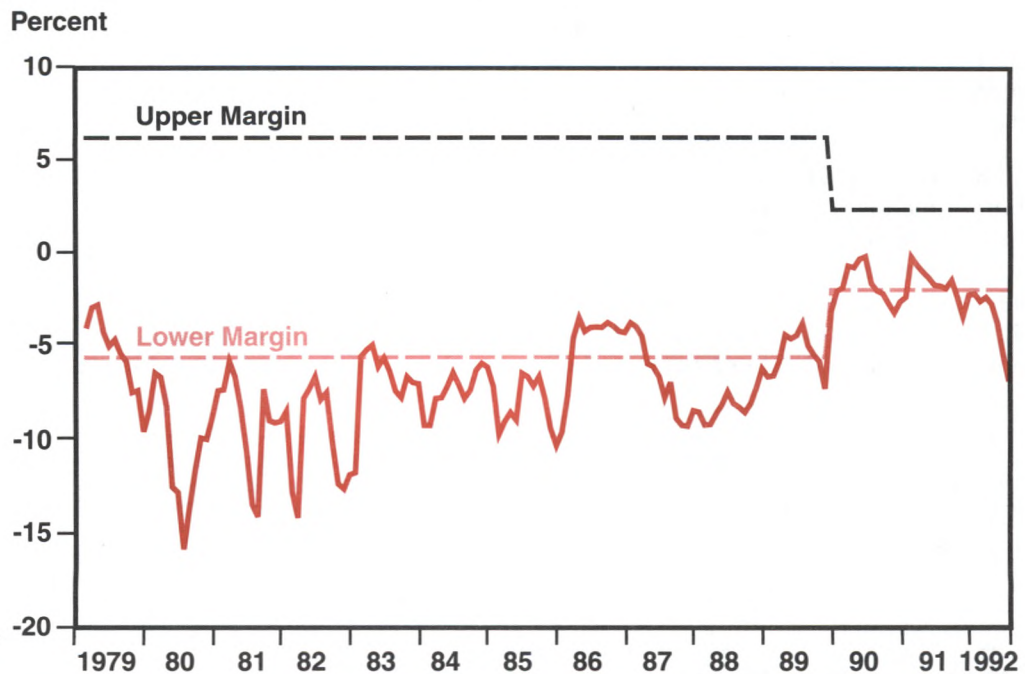
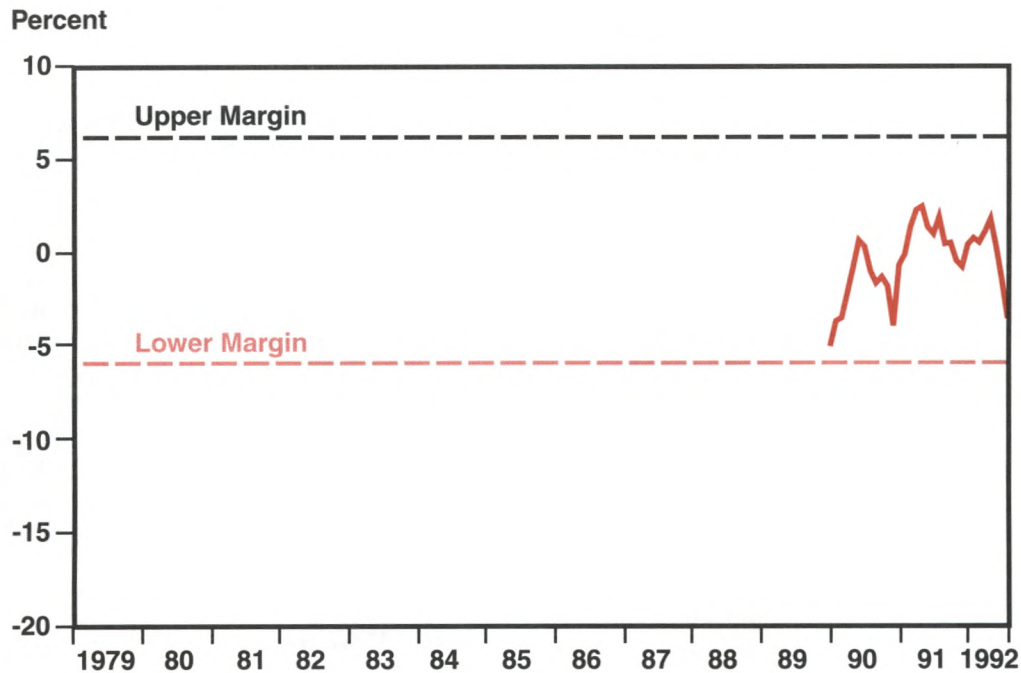




Figure 8  
**DM/ Spanish Peseta Exchange Rate, 12 Months  
 Expectations (as Deviation from Central Rate)**



domestic credit and foreign assets held on the central bank's balance sheet. Now, imagine that all domestic assets are increasing at a steady pace, in part, to finance a chronic government budget deficit. Since the exchange rate (defined as the foreign currency price of one unit of home currency) is fixed, a steady outflow of foreign exchange reserves occurs if the growth of domestic credit exceeds the growth of money demand. In this case, foreign exchange reserves eventually are exhausted and the central bank has to withdraw from foreign exchange intervention. Once exchange rates are flexible, the price level will rise and the exchange rate will fall at the same pace as domestic credit growth in excess of money demand.

There is a problem, however. At the moment of the switch to a flexible exchange rate, investors with assets denominated in domestic currency suffer a capital loss since the exchange

rate falls discretely. Consequently, forward-looking speculators, foreseeing the imminent collapse, would try to sell domestic currency and buy foreign currency before the central bank runs out of reserves. A speculative attack on the foreign exchange reserves of the central bank takes place, and a collapse occurs. With perfect foresight, no discrete drop in the exchange rate occurs at the time of the collapse.

For assessing the timing of the attack, it is useful to look at the so-called shadow exchange rate.<sup>28</sup> The shadow exchange rate is the exchange rate that would result if the speculative attack that exhausts all foreign exchange reserve holdings of the central bank would take place today. The speculative attack takes place when the shadow exchange rate is equal to or below the current exchange rate. As long as the shadow exchange rate is higher than the current (pegged) exchange rate, a speculative attack

<sup>28</sup>See Flood and Garber (1984b).

<sup>29</sup>This is known in the literature as the peso problem.



would bring losses for the speculator. On the other side, a speculative attack is profitable if the shadow exchange rate is lower than the current (pegged) exchange rate. Competition among speculators reduces expected losses and profits down to zero. This story provides an explanation of why a speculative attack may take place even when the central bank still has sizable reserves. The ultimate reason for the collapse is the inconsistency of the pegged exchange rate with the growth of domestic credit. But the point to remember is the pivotal role of expectations in bringing the collapse forward.

Perfect foresight, however, is not a realistic assumption. What happens when this assumption is dropped? Imagine that there is uncertainty either about domestic credit growth or about the minimum size of foreign exchange reserves that would cause the central bank to adopt flexible exchange rates. Again, the speculative attack takes place when the shadow exchange rate is equal to or below the actual rate. Now, however, uncertainty implies that there is always a probability greater than zero for the policy switch to take place in the next period. Moreover, this probability increases over time, since the decline in reserves makes it more likely that the next realization of credit growth forces the switch to a free float. As a result, there is a positive (and, over time, increasing) interest rate differential, implying an expected depreciation of the home currency exchange rate.<sup>29</sup> In addition, there may be a discrete drop in the exchange rate at the moment of the policy switch. These regular features of a balance-of-payments crisis are not captured in the perfect-foresight case.

A chronic fiscal deficit financed by the central bank is the driving force of the collapse described above. This assumption does not meet the experience of Britain in 1992. The Bank of England did not have to finance a budget deficit, domestic credit growth was low, and there was no continuous outflow of reserves. So, an alternative conceptual analysis would consider a situation in which a country initially adopts fiscal and monetary policies in line with the maintenance of the pegged exchange rate. Nevertheless, suppose the market expects the central bank to switch to a free float and that it would ease monetary policy if a speculative attack exhausted the foreign exchange reserves

of the central bank. In contrast to the two cases discussed above, the policy of the central bank in this case is not exogenous to the speculative currency attack. As a result, there may be several equilibria, depending on the expectations of the market. If there is no attack, the exchange rate is perfectly viable forever. If there is an attack, the central bank gives in and accepts a depreciation of its currency.

This model of a self-fulfilling speculative attack is quite attractive in the context of the British case. Remember that the main reason for joining the ERM was the credibility that the ERM seemed to provide for monetary policy. Later, realignments were rejected repeatedly because of the suspected risks to the credibility of the system. So, when the speculative attack on the pound revealed that the established exchange rate parities actually had lost their credibility, the situation had to be reevaluated. The costs of defending the established parities had increased and it was quite possible that monetary authorities would regard these costs as being too high.

### *The British Experience*

The main characteristic of the defense of the pound in September 1992 was the reluctance of British monetary authorities to raise interest rates. What are the implications of this policy for speculative currency attacks?<sup>30</sup> Consider the general case with a pegged exchange rate and selling pressure against the home currency. So long as interest rates are free to move, competition among speculators for expected profits from an attack on the home currency drives up domestic interest rates. If the central bank prevents these interest rates from rising, that brake on the demand for foreign exchange disappears. As a result, the central bank will have to absorb the larger demand for foreign exchange. In the end, the central bank, by pegging the interest rate, offers the market a favorable opportunity for a run on Britain's reserves. Investors may speculate at very low costs, and the speculative currency attack thus easily may involve huge amounts of funds.

A second characteristic of the British episode was the government's borrowing on the international capital market to increase foreign exchange

<sup>30</sup>Goldstein et al. (1993) first examined this extension of the basic model.



change reserves. As emphasized above, a speculative attack occurs when the shadow exchange rate is equal to or below the current pegged exchange rate. The size of the foreign exchange reserves, in turn, has an effect on the shadow exchange rate. Since a run on foreign exchange reserves reduces the domestic money supply (assuming the effect is not sterilized), the money supply reduction associated with running out of a larger stock of foreign reserves is also larger. The potentially larger reduction in the domestic money supply, in turn, raises the shadow exchange rate.

Another device to postpone speculative currency attacks is capital controls. While Britain did not use them at all in 1992, the ERM crisis in September 1992 was the first, since virtually all capital controls in the EC had been removed. Thus, it may be useful to take a look at how capital controls work in a speculative currency attack. The simplest way to model capital controls is to treat them like a tax on foreign interest earnings. To simplify the account, let the starting point be a situation in which the fundamentals are in order: i.e., no chronic fiscal deficit or other influence is causing a gradual depletion of the central bank's foreign exchange reserves. The pre-tax foreign interest rate continues to be assumed as constant throughout the analysis.

Since a speculative attack takes place when the shadow exchange rate is equal to or below the current pegged exchange rate, we direct our attention again to the effects of the instrument on the shadow exchange rate. A tax on foreign interest earnings reduces the net return on foreign assets. As a result, an excess supply of foreign currency emerges at the current exchange rate. Since the exchange rate is pegged, the excess supply must be absorbed by the central bank. This leads to higher foreign exchange reserves, a higher money supply, and a reduction in the domestic interest rate (reflecting the reduced level of the net return rate on foreign assets). The increase in foreign exchange

reserves, in turn, raises the shadow exchange rate in much the same way as in the example in which reserves are increased by borrowing. A tax on foreign interest earnings, by pushing up the shadow exchange rate, may postpone a speculative attack. To put it another way, the removal of capital controls in the EC removed a shelter for weak ERM currencies.<sup>31</sup>

Overall, the distaste of British monetary authorities for allowing short-term interest rates to rise made the defense of the pound in September 1992 more difficult. The effects on speculation were particularly grave since there were no restrictions on capital movements. Borrowing foreign exchange reserves by the authorities—short of unlimited borrowing—was no serious substitute under these circumstances.

## CONCLUSIONS

The near collapse of the ERM in 1992-93 reflected the vulnerability of pegged exchange rate systems. This feature of pegged exchange rates is hardly new. Standard theory in international macroeconomics teaches that monetary autonomy and pegged exchange rates are incompatible in the absence of capital controls. Divergent economic forces or simple political events may trigger a speculative attack, leading to the collapse of the pegged exchange rate.

For policymakers, the possibility that speculative currency attacks may be self-fulfilling is particularly troublesome. In Europe, proponents of pegged exchange rates have argued for years that exchange rate pegging to the mark provides a way to import the reputation of the Bundesbank and get a credible anchor for monetary policy. For obvious reasons, this approach had a special appeal to countries lacking a credible monetary policy. Yet the argument is less convincing if speculative attacks are self-fulfilling and the credibility of a country's exchange rate commitment can vanish as quickly and unexpectedly as it did in September 1992.

<sup>31</sup>Of course, capital controls are not as efficient as true taxes on foreign exchange. More importantly, capital controls typically are not introduced when there is no pressure on foreign exchange reserves. Nevertheless, the analysis here clarifies that capital controls can reduce the prevailing excess demand for foreign currency, boosting foreign exchange reserves and the shadow exchange rate. This analysis ignores the reduction in incentives to invest in a country that imposes capital controls as well, and this influence could also bode ill for any actual boost in the shadow price.



A necessary condition for such an attack to occur is that the markets expect the central bank to shift policy as a result of the attack. If the markets have reasons to believe that a country will relax monetary policy once a speculative attack has exhausted the central bank's reserves, an attack is more likely. In the case of Britain, a persistent recession prepared the way for such beliefs. Uncertainties about the prospects for EMU and the reluctance of British authorities to allow short-term interest rates to rise in defense of the pound subsequently accelerated the attack and reinforced a realignment of the pound. In short, the United Kingdom could not convince the markets of its commitment to a fixed exchange rate. This credibility is an essential factor in maintaining an effective exchange regime.

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