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An Independent Central Bank in a Democratic Country: The Federal Reserve Experience

by William J. McDonough

I am honored this evening to address this distinguished group of central bankers, economists, representatives of international institutions, and others interested in the process of reform in Eastern Europe and the Newly Independent States. In sponsoring this conference on the role of central banks in the region, the University of Chicago Law School, and especially Professors Kenneth Dam and Geoffrey Miller, deserve our deepest thanks.

One very timely issue confronting policymakers in Eastern Europe and the Newly Independent States is the proper scope for central bank independence.... Central banks that are both powerful and autonomous, yet at the same time responsive to the needs and wishes of their people, are fundamental to the economic development and political stability of all countries.

One very timely issue confronting policymakers in Eastern Europe and the Newly Independent States is the proper scope for central bank independence. As the organizers of this conference have rightly noted, central banks that are both powerful and autonomous, yet at the same time responsive to the needs and wishes of their people, are fundamental to the economic development and political stability of all countries.

Integral to economic development and political stability is a commitment to the liberty, dignity, and independence of people. These are ideals all our countries share today. But liberty and independence, while precious, assume different form as they take root in countries throughout the world. How much liberty and independence do we give to our people? How much is responsibility for governing our people to be centralized? How much is sovereignty to be divided? In the United States, these are questions that our ancestors sought to answer and that we continue to air and debate in public.

This evening, I would like to share with you some of my views as to how these issues took hold in the United States in the development of the Federal Reserve System and why I believe central bank independence is so very important in a democracy. Independence has, perhaps, a special meaning in the context of the United States' experience with central banking. We as a nation were born primarily of individuals who set an independent course for themselves by leaving their own countries to seek a better life in the New World. Our country owes its growth, its prosperity, and its prominence to these individuals. How to preserve the individual liberty they sought and won has become an enduring theme in the history of the United States.

This history reflects the dynamic tension set forth in our Constitution of checks and balances to ensure that the powers of government do not alienate the rights of people. The responsibilities of government versus the rights of individuals, the centralization of power in the federal government versus its dispersal to the states, the mistrust of government versus faith in individuals are notions that are as alive in the Federal Reserve System today as they were when our republic was being shaped more than two centuries ago.

Compared with a number of other countries' experience

Remarks by William J. McDonough, President, Federal Reserve Bank of New York, before the University of Chicago Law School Conference on Central Banks in Eastern Europe, Chicago, Illinois, April 22, 1994.

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with central banking, which goes back centuries, the Federal Reserve, at some eighty-years-old, is a relative youth. Not widely known is that there were two earlier central banks in the United States prior to the creation of the Federal Reserve System in 1913. The first was chartered in 1791, the second in 1816. Each bank remained in operation for twenty years. A look at this bit of history is useful to understanding our central banking system today.

The responsibilities of government versus the rights of individuals, the centralization of power in the federal government versus its dispersal to the states, the mistrust of government versus faith in individuals are notions that are as alive in the Federal Reserve System today as they were when our republic was being shaped more than two centuries ago.

The First Bank of the United States emerged in the aftermath of the revolutionary war. The Continental Congress, lacking the power to tax and needing means to finance an army, was dependent on the individual states to meet its requests for funds as well as on the largesse of Great Britain's enemies at the time. France was particularly important to the United States in this period. A remark by Alexander Hamilton in 1780 about Benjamin Franklin, then our minister in Paris, tells it all. "Franklin," Hamilton is supposed to have said, "having drawn lightning from the clouds, was expected to draw money from the coffers of the King of France with the same ease and whenever it was required."

Not widely known is that there were two earlier central banks in the United States prior to the creation of the Federal Reserve System in 1913. The first was chartered in 1791, the second in 1816.

Ten years later, as Secretary of the Treasury, Hamilton was able to persuade President Washington and Congress to charter such an institution. The advantages of a national bank were clear, Hamilton argued. First, it would augment "the active or productive capital of a country;...as it is a well-established fact, that banks in good credit, can circulate a far greater sum than the actual quantum of their capital in gold and silver." Second, a national bank would allow the central government "greater facility...in obtaining pecuniary aids, especially in sudden emergencies." And third, it would facilitate the payment of taxes.

The charter for the First Bank of the United States was signed in February 1791. The first central bank was, as the Federal Reserve System is today, a mix of public and private interests. While serving as the government's bank, the First Bank, unlike the Federal Reserve, was also allowed to conduct commercial business. It was capitalized at $10 million, of which one-fifth was subscribed by the government and the balance by private shareholders. Its demand notes were made receivable in all payments to the government, although at the time the only media of exchange the Constitution considered legal tender were gold and silver or specie. The First Bank was managed by twenty-five directors chosen by the shareholders, who also selected one director as president. When its charter lapsed in 1811, it was not renewed.

The advantages of a national bank were clear, Hamilton argued. First, it would augment "the active or productive capital of a country"....Second, [it] would allow the central government "greater facility...in obtaining pecuniary aids, especially in sudden emergencies." And third, it would facilitate the payment of taxes.

The Second Bank of the United States, which was chartered in 1816, mirrored the structure and functions of the First Bank, except that five of its twenty-five directors were chosen by the President with the approval of the Senate. The Second Bank was formed largely because a widespread run on the state-chartered banks in 1814 had resulted in their suspending payment for their notes in specie. Although the state banks continued to remain in business, Congress concluded that a new central bank was needed, if for no other reasons than to marshal the banking system back onto specie payments and restore a uniform currency.

Neither the First nor the Second Bank of the United States was without controversy....The opponents of the First Bank...mistrusted the central bank, seeing in it both a subordination of the states' prerogatives and a federal government that was exceeding its powers.

Neither the First nor the Second Bank of the United States was without controversy. The proponents of the First Bank supported the views of Alexander Hamilton. They were primarily merchants and entrepreneurs who valued paper money and easy access to credit as means to improve their business and wealth. They looked to a strong federal government and the central bank to help them achieve these goals.

The opponents of the First Bank, and the main cause of its failure to have its charter renewed in 1811, were the

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farmers, or agrarians, who dominated the population at the time and whose spokesperson was Thomas Jefferson. To the agrarians, political independence and a strong central government were incompatible. Economically, they were conservative. Their precepts were frugality and the avoidance of debt, and their preference was for metallic, as opposed to paper, money. They mistrusted the central bank, seeing in it both a subordination of the states' prerogatives and a federal government that was exceeding its powers. Thus, they challenged its constitutionality.

The agrarians also opposed the Second Bank of the United States. Under the leadership of Andrew Jackson, who became President in 1829, they were determined to destroy the Second Bank. Jackson did so by vetoing the renewal of the bank's charter.

The failure to replace the Second Bank of the United States when its charter was not renewed in 1836 "ushered in a generation of bank anarchy and monetary disorder," according to one historian of the period. It was not until repeated financial crises with their associated business bankruptcies and general economic contractions, notably the panic of 1907, that the need for a central banking system found support in Congress.

The Federal Reserve Act was passed by Congress in 1913 with the goals of providing for a safer and more flexible banking and monetary system. Its original purposes were to provide the country with an elastic currency, establish facilities for discounting commercial credits, and improve the supervision of the banking system. More broadly, in establishing the Federal Reserve System, Congress sought to create an institution that would combine the benefits of public and private outlooks while insulating its functions from day-to-day political pressures.

The central banking system Congress put in place [in 1913] reflects the country's historic concerns, traceable to its early experiments with central banking, about a centralized government monopoly of the creation of money and the desire to disperse that control through a system incorporating regional diversity and private sector involvement. The Federal Reserve today is thus a regionally dispersed institution with both government and private interests represented in its ownership and control.

The central banking system Congress put in place reflects the country's historic concerns, traceable to its early experiments with central banking, about a centralized government monopoly of the creation of money and the desire to disperse that control through a system incorporating regional diversity and private sector involvement. The Federal Reserve today is thus a regionally dispersed institution with both government and private interests represented in its ownership and control, a testament to the long-standing belief that formal involvement by the private sector is essential to the credibility and management of the nation's central bank.

Initially, the government was represented on the seven-member Board of Governors by the Secretary of the Treasury and the Comptroller of the Currency. In 1935, Congress removed these two officials from the Board in an effort to strengthen the Federal Reserve's independence from political pressures within the government. The seven governors who now comprise the Board are appointed by the President with the approval of the Senate. Each must come from a different geographic region, or district. Originally, Board members were appointed for ten-year terms so as to insulate them from short-term political pressures; the terms were increased to fourteen years in 1935.

To balance central oversight in Washington with regional and private sector input, Congress created twelve Federal Reserve district banks, each serving a geographic region. The creation of the district banks as separate corporate entities with local boards of directors and member banks as stockholders was a key aspect of the Federal Reserve Act. The Reserve Bank directors, then as now, are one of the primary means by which the Federal Reserve Banks interact with the private sector on an ongoing basis. Six of the nine directors of each district bank are elected by the member banks; three are appointed by the Board of Governors. Of the nine directors, three represent banks and six represent the public, with particular consideration to the interests of agriculture, commerce, industry, services, labor, and consumers. The Reserve Bank presidents are appointed by the directors, subject to Board approval.

In the early decades of the Federal Reserve, responsibility for formulating and implementing monetary policy was not centralized in the Federal Open Market Committee, or FOMC, as it is today. Instead, the twelve district banks undertook open market operations and set the discount rate for banks in their areas, which required the Board's approval. In 1922, the district banks created their own committee to coordinate their open market activities. Since 1935, the FOMC has existed in its current form.

The debate surrounding the creation of the FOMC pitted some members of Congress who wanted only the Presidentially-appointed governors in Washington to set monetary policy against others who wanted the regional Reserve Banks to continue control of the Committee. The compromise reached allows all seven governors and the president of the Federal Reserve Bank of New York a permanent vote on the Committee but only four of the remaining eleven district bank presidents a vote at any time. This compromise reflects that delicate tension of checks and balances on centralized authority that lies at the core of the Federal Reserve System today.

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This brings me to consider the basic functions and goals of central banks in democratic countries. We all recognize that the ways central banks choose to carry out their functions and the importance they attach to specific instruments or tools to achieve their goals vary across countries. The degree of independence central banks have within their governments also varies across countries. These differences are to be expected. They reflect each country's individual history, traditions, financial market structures, and legal frameworks.

We all recognize that the ways central banks choose to carry out their functions and the importance they attach to specific instruments or tools to achieve their goals vary across countries....Nonetheless, I do believe that central banks in democracies the world over share certain basic functions and goals in common.

Nonetheless, I do believe that central banks in democracies the world over share certain basic functions and goals in common. What are these? First and foremost, a central bank's most time-honored duty is to formulate and implement monetary policy—with its twin goals of promoting domestic price stability while stimulating real growth. These goals remain at the core of central bank policy.

A central bank's most time-honored duty is to formulate and implement monetary policy—with its twin goals of promoting domestic price stability while stimulating real growth.

Integral to achieving price stability is the need for central banks to avoid the direct financing of government budget deficits. Central banks can't indulge in this practice and simultaneously hold inflation in check. Such financing runs the clear risk that the central bank's balance sheet can become weighted down with low-quality assets. In such circumstances, confidence in the financial integrity of the central bank can only suffer.

At the same time, central banks must strive to maintain positive real interest rates, which tend to increase private savings and discourage investments with low expected returns, thereby promoting growth in the economy. As a further task, central banks must work with their governments to help keep real exchange rates competitive if their countries are to increase exports, finance external debt, and build reserves.

Central banks implement monetary policy by affecting the growth of money and credit in the economy in response to deflationary or inflationary pressures as they arise. Central banks alter monetary policy through the use of a set of instruments, or tools. In the United States, these tools are grouped into three broad categories: 1) setting reserve requirements for banks, 2) setting the lending rate and making loans to commercial banks, and 3) buying and selling government securities or other government-guaranteed instruments. As lenders of last resort, central banks also stand ready to use the available policy instruments to forestall national liquidity crises and financial panics.

Another major responsibility of central banks is to oversee, or have some participation in the oversight of, their banking and financial systems. A sound banking and financial structure is essential for an effective monetary policy. Confidence in the soundness of the banking and financial system is what mobilizes a society's savings, allows the savings to be channeled into productive investments, and encourages economic growth.

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Supervision of the banking system gives central banks the knowledge and ability to respond to and head off financial disruptions before they result in economic crises. The regulatory role of central banks strengthens their ability to act as ultimate providers of liquidity to the financial system. Moreover, because monetary policy involves judgments about conditions in financial markets and financial institutions, including a detailed working knowledge of those markets and institutions, a major ingredient in the decision-making process comes from the direct, hands-on knowledge central banks gain through interaction with institutions under their supervision. I am firmly convinced that the Federal Reserve's hands-on involvement in bank supervision is integral to its ability to meet its monetary policy responsibilities and contain or forestall crises, if they emerge.

The third major function of central banks is to oversee the payments mechanism. A payments mechanism that is dependable and allows the efficient clearing and settlement of interbank transactions is crucial to a well-functioning financial system.

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dependable and allows the efficient clearing and settlement of interbank transactions is crucial to a well-functioning financial system. Commercial banks participate directly in a country's payments system, extending short-term credit in their role as financial intermediaries in the payment, transfer, and settlement of financial instruments, including interbank deposits and government securities. Central banks participate directly in the payments system as well, in part because numerous types of payments, including large-value interbank transfers and check clearing settlements, are likely to occur across their books.

The central bank's participation in the payments system and its role as supervisor of the system enhance its ability to foresee and prevent or moderate financial disruptions. The payments system is a source of major credit risk because of the lags in time during which the processing of transactions takes place. During these intervals, one party extends credit to another pending the receipt of funds. These lags between the payments associated with both sides of a financial obligation, which can vary from hours to days, result in large, interwoven extensions of credit among financial institutions.

A payments gridlock or other financial disruption can arise from numerous sources, including the sudden failure of a major participant, credit concerns by some participants which make them reluctant to release payments, and various technical interruptions. Because a gridlock can spread rapidly throughout the financial system, central banks have a keen interest in avoiding a payments system disruption and ensuring that participants in the system manage their credit risks properly.

Central banks neither can nor should be fully independent of government, since it is governments—and not central banks—that hold final responsibility for the economic and financial policy of the country. Nevertheless, some degree of central bank independence is critical.

In carrying out our functions as central bankers, we must ask ourselves why it is desirable that central banks in democracies have an important degree of political independence within government. I think we would all agree that central banks neither can nor should be fully independent of government, since it is governments—and not central banks—that hold final responsibility for the economic and financial policy of the country. Nevertheless, some degree of central bank independence is critical. Why is this so?

Basically, the greater the independence the central bank has, the less subject it is likely to be to short-term political pressures. Central banks under the direct day-to-day control of governments seem inevitably to be tempted to promote easy credit policies, particularly when elections are in view, or, even worse, to finance government budget deficits directly. While these policies may relieve certain short-term problems, such as high unemployment or difficulties in financing fiscal deficits, they ultimately result in higher inflation and the need for severe credit tightening in the future. Independence is also helpful to central banks in carrying out their supervisory responsibilities, by enabling them to resist pressures to relax or strengthen regulatory standards depending on political winds.

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A number of studies in recent years have found some empirical basis for the desirability of central bank independence as well. Although these studies cannot prove causality, they do find that the greater the independence of the central bank, the lower the average level of inflation the country experiences and the less volatile the inflation rate.

In my view, controlling inflation is particularly important at this juncture, not simply for the United States but also for other industrial countries in particular. Like a number of these other countries, the United States has reached the point at which the level of its public sector debt and its persistently large budget deficit are such that fiscal policy is no longer available as a tool of macroeconomic policy. If fiscal policy is unavailable to address some of the social needs that now confront so many of our economies, it becomes especially important for inflation to remain under control, largely because of its regressive tax aspects. In the current environment, price stability is therefore critical not only for the classic economic reasons but also because it takes on a greater social importance as well.

But, we may reasonably ask, what exactly do we mean by central bank independence and how do we know it when we see it, recognizing, of course, that de jure measures of independence may not fully reflect de facto independence? Without being exhaustive, let me suggest a few answers and how they apply to the Federal Reserve System today.

One way to assess independence is to determine the extent to which the central bank enjoys freedom from the government in formulating and implementing its policies, particularly monetary policy. A key component of this measure of independence is the degree of freedom the central bank has to change official interest rates and select the mix of policy instruments and techniques it uses in undertaking

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open market operations. In these respects, I believe that Congress has provided the Federal Reserve with considerable scope for independently exercising its best judgment as to what monetary policy should be.

Another way to assess independence is to look at the procedures in place for central bank leaders to be nominated and dismissed. In the case of the Federal Reserve, staggered fourteen-year terms for governors clearly insulate the leadership from short-term political pressures and fears of falling out of grace politically. Moreover, once appointed, governors can be removed only for cause.

Ultimately the only way central banks can achieve their goals is if their integrity is without question and people have confidence in the policies they pursue. At the end of the day, it is public confidence that is a central bank's most precious commodity in a democracy.

Still another way to measure independence has to do with the way the central bank finances itself. In the United States, the Federal Reserve System is self-financing, its earnings stemming principally from interest income on the portfolio of government securities it holds to conduct open market operations. Financing itself internally means that the Federal Reserve is not dependent on Congress for annual appropriations and is therefore insulated from pressures that might otherwise flow from the "power of the purse."

Whatever their degree of independence, central banks typically are nonetheless created by and accountable to legislatures. In the United States, the Federal Reserve is accountable to Congress, which has delegated to it specific powers Congress is granted by the Constitution. Congress thus retains the authority to oversee and instruct the Federal Reserve as it sees fit.

The Federal Reserve accounts to Congress in numerous formal and informal ways. There are continuous contacts between officials in the Federal Reserve and the government. Twice a year, the Federal Reserve reports to Congress on its monetary policy targets and its senior officials routinely appear before congressional committees and subcommittees.

Over the years, as at present, Congress and the Administration have periodically sought to alter certain elements of the Federal Reserve. These efforts have contributed to many changes in the Federal Reserve's procedures and authority, in many cases allowing the Federal Reserve to evolve and keep pace with the needs of changing times. At the same time, it is important to recognize that, even in the current debate, the fundamental independence of the Federal Reserve is not in jeopardy. The Federal Reserve's basic independence today is a widely shared value, which no one questions.

In reviewing the experience of central banking in the United States, I cannot help but conclude that ultimately the only way central banks can achieve their goals is if their integrity is without question and people have confidence in the policies they pursue. At the end of the day, it is public confidence that is a central bank's most precious commodity in a democracy.

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Netting Agreements and the Credit Exposures of OTC Derivatives Portfolios

by Darryll Hendricks

Recent years have witnessed substantial growth in over-the-counter (OTC) derivative transactions, much of it concentrated in interest rate and cross-currency swap agreements. The rapid expansion of this market has necessarily given rise to credit risk concerns, particularly among the large, internationally active commercial banks that are dealers in OTC derivatives. Although rates of contract default have been quite low to date, both market participants and their supervisory authorities are eager to identify strategies for managing the credit exposures associated with OTC derivatives.

One strategy developed by dealer institutions is the use of bilateral closeout netting agreements. A bilateral closeout netting agreement is a legally binding agreement between two parties (customarily referred to as counterparties) stipulating that if one counterparty defaults, legal obligations arising from derivative transactions covered by the netting agreement must be based solely on the net value of such transactions. With a valid bilateral closeout netting agreement in place, a counterparty cannot simultaneously default on negatively valued derivative contracts while also continuing to demand payments on positively valued derivative contracts.

This article examines the effectiveness of bilateral closeout netting agreements in reducing the credit exposures associated with OTC derivatives. Particular attention is given to the difficult issue of whether netting agreements reduce potential credit exposures, a credit risk concept largely unique to OTC derivative transactions.

The article finds that potential credit exposures can be reduced on average by the adoption of netting agreements. The agreements dampen fluctuations in the volatility of credit exposures, thereby reducing the volatility of these exposures on average, although not at every point in time. The decreased volatility of credit exposure on average in turn leads to a reduction in potential credit exposure on average.

The article's first section explains the concept of potential credit exposure and its treatment by international bank supervisors under the Basle Accord. This background leads to a discussion of the magnitude of U.S. commercial banks' credit exposures to OTC derivatives.

Credit exposures for OTC derivatives

Credit risk is perhaps the predominant risk faced by all banking institutions. Indeed, with many traditional banking activities such as lending, credit risk engendered by the possibility of borrower default is the primary risk facing the bank. Derivative transactions can also lead to credit risk since one of the two counterparties will very likely have to make payments to the other under the terms of the contract.

Interest rate swaps

Interest rate swaps, the largest single class of OTC derivative contracts, provide a useful example of the risks of derivative transactions.[1] The swaps are typically structured and priced so that no exchange of funds accompanies the initiation of the contract. Over the life of the contract (which can range from a few months to many years), however, one side or the other will often be required to make payments under the terms of the contract. For example, a so-called plain vanilla interest rate swap obliges the counterparties periodically to swap the difference between a contractually

[1] Although this article focuses on interest rate swaps, the arguments presented here also apply to many other derivative instruments.

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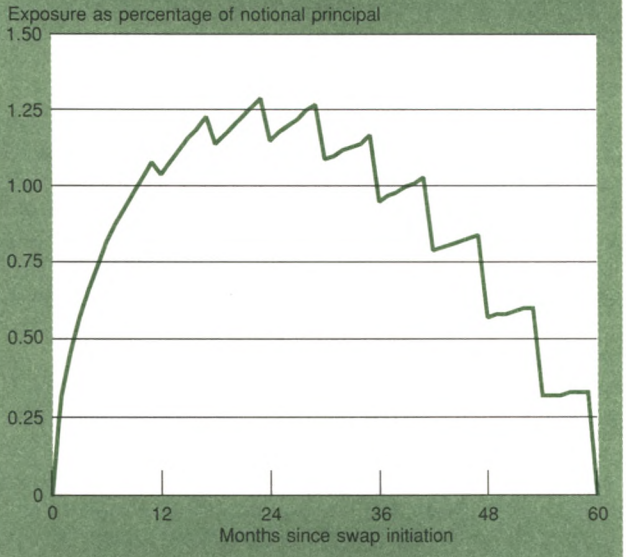
determined fixed interest rate and a floating rate of interest (commonly six-month LIBOR) multiplied by a notional amount of principal. Thus one of the counterparties assumes the role of fixed rate payer and floating rate receiver, while the other counterparty acts as the floating rate payer and fixed rate receiver.

Many interest rate swaps specify that payments be made semiannually. If floating rates have risen above the contractually specified fixed rate, then the floating rate payer will make a payment to the floating rate receiver based on this differential. In this instance, a default by the floating rate payer will lead to a credit loss by the floating rate receiver. If no recovery is possible, the total credit loss will not consist simply of the amount of the next payment due under the terms of the swap contract but will equal the present value of the net interest payments over the remaining life of the contract.[2] This amount is termed the *replacement cost* of the derivative contract.

[2] In certain yield curve environments (for example, when the yield curve is steeply declining), the pay-floating side of the swap could have a positive market value even if the floating rate currently exceeds the fixed rate. In this case, the floating rate payer has credit exposure to the floating rate receiver.

Chart 1

Average Replacement Cost Profile for Five-Year Interest Rate Swap



Notes: The chart is generated from 5000 simulations of a matched pair of interest rate swaps. The interest rate model used in the simulation is taken from Francis A. Longstaff and Eduardo S. Schwartz, "Interest Rate Volatility and the Term Structure: A Two-Factor General Equilibrium Model," *Journal of Finance*, September 1992, pp. 1259-82. Although the volatility of the short rate in this model is variable, it averages approximately 175 basis points per year in absolute terms.

Current credit exposure

The replacement cost of a derivative contract is the appropriate measure of the credit loss resulting from the default of one's counterparty. If the derivative contract has a positive market value to the nondefaulting counterparty, then the replacement cost of the contract will equal this market value, since this is the amount that counterparty would have to pay in the market to obtain a derivative contract with the same terms. Note, however, that if default occurs on derivative contracts with negative market values to the nondefaulting counterparty, then that counterparty is typically *not* free to walk away from these transactions and reap a windfall gain.[3] This condition implies that the replacement cost of a derivative contract is equal to the greater of zero and the current market value of the contract.

In the absence of closeout netting agreements, the *current credit exposure* of a portfolio of derivative contracts therefore equals the sum of the replacement costs of those contracts. Current credit exposure, however, only provides a snapshot of credit exposure at a single point in time. The nature of derivative contracts is such that their market values can fluctuate substantially, even over relatively short periods of time. Chart 1 shows the average replacement cost of a five-year interest rate swap over its lifetime.[4] On average, replacement costs are pushed upward over time by the divergence of interest rates from the levels prevailing at the initiation of the swap. This effect is eventually overtaken, however, by the semiannual transfers of payments required by the swap, because the fewer the remaining payments, the lower the remaining credit exposure. The combination of these two effects produces the characteristic shape of an interest rate swap pictured in Chart 1.

Two important points emerge from Chart 1. First, the average credit exposure of an interest rate swap is typically a small percentage of the notional amount of the swap; at its maximum, the average exposure is only slightly above 1.25 percent of the notional amount. Second, swap credit exposures can fluctuate considerably over time, particularly when these changes are measured on a percentage basis. For example, a given swap's exposure can easily rise by 25 percent or more over a six-month period.[5] In fact,

[3] Contract provisions that do allow such gains are known as limited two-way payments provisions or walkaway clauses. The latest Basle Supervisors' Committee proposal (April 1993) would prohibit contracts with this feature from being eligible for the reduced capital treatment associated with netting.

[4] Chart 1 is generated from 5,000 simulations of a matched pair of five-year interest rate swaps. Although the volatility of the short rate in this model is variable, it averages approximately 175 basis points per year in absolute terms.

[5] Observe that the average exposure rises from approximately 0.75 percent of the notional amount six months from inception to over 1.00 percent of this amount twelve months from inception, a percentage increase of 33 percent.

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this type of rapid change in credit exposure is even more common than Chart 1 suggests, since the chart only shows what happens on average. Moreover, the capacity for rapid changes in credit exposures is a feature of derivatives generally, not simply of the interest rate swap that is used here as an example.[6]

Potential credit exposure

Because the credit exposure of derivatives can fluctuate dramatically, measuring current exposure at a single point in time is not the most prudent approach to assessing the credit exposure of an OTC derivatives portfolio. Accordingly, both market participants and supervisors have chosen to use the concept of *potential credit exposure* to measure the possibility of increases in current credit exposure over a fixed time horizon. That is, the potential exposure of a portfolio measures how much the current credit exposure of that portfolio could increase over some period of time in the future. A commonly used time horizon for this purpose is the six-month period extending from the point in time when current credit exposure is measured.

Clearly one cannot predict precisely how the credit exposure of a portfolio will evolve over time, since exposures are tied to unpredictable movements in underlying market factors. It is possible, however, to use economic simulation models to estimate reasonable upper bounds for increases in current credit exposures. These upper bounds are frequently expressed in terms of a statistical degree of confidence—that is, a confidence level of 95 or 99 percent. In using these terms, a market participant is estimating that a larger credit exposure will occur only 5 percent or 1 percent of the time, respectively, given the built-in assumptions about the probability distribution of the market interest rates or other factors.

In a 1993 study of derivatives, the Group of Thirty recommended that "dealers and end-users...measure credit exposure on derivatives in two ways: (1) current exposure... and (2) potential exposure, which is an estimate of the future replacement cost of derivative transactions."[7] The inclusion of this recommendation in a study prepared with substantial help from market participants confirms that market participants recognize the importance of potential exposure.

International banking supervisors have also recognized the need to measure potential credit exposures for OTC derivatives and to hold capital against the credit equivalent amounts of OTC derivatives, including the potential exposure portion. The 1988 Basle Accord includes an approach to measuring the total credit exposure of OTC derivatives based on the sum of current credit exposure and potential credit exposure.[8] The Accord specifies a procedure for calculating an amount (commonly known as the "add-on") to cover potential credit exposure. This procedure involves multiplying the notional amount of the derivative contract by a factor that depends on the remaining maturity of the contract and the type of underlying security (Table 1).

Derivatives and credit exposure: empirical estimates

Using the Basle framework, it is possible to provide some indication of the magnitude of the current and potential credit exposures associated with OTC derivatives. Chart 2 plots the growth in OTC derivative activity by U.S. commercial banks as measured by total notional amounts on a quarterly basis. Chart 3 plots the current credit exposures and add-ons (to cover potential credit exposure) for the same sample of institutions over the same time period. Note that the trends in notional amounts are not always identical to the trends in credit exposures.

The aggregate current credit exposure of U.S. commercial banks to OTC derivatives was approximately $143 billion as of December 31, 1993. Approximately $60 billion was also assessed under the Basle Accord on this date as the aggregate add-on charge for the coverage of potential credit exposure.[9]

Evidence in Chart 3 suggests that the add-on charges performed well during the period from the end of the first

[6] Other contract types can have very different exposure profiles than that shown in Chart 1. The cross-currency swap, for example, has an average replacement cost profile that rises throughout its life.

[7] Group of Thirty, *Derivatives: Practices and Principles, Recommendations* (Washington D.C., 1993), p. 13.

[8] Basle Supervisors' Committee, *International Convergence of Capital Measurement and Capital Standards* (Basle, Switzerland, July 1988). The Basle Committee on Banking Regulations and Supervisory Practices comprises representatives of the central banks and supervisory authorities of the Group of Ten countries (Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, the United Kingdom, and the United States), Switzerland, and Luxembourg. The Committee meets at the Bank for International Settlements, Basle, Switzerland.

[9] Note that these amounts are exposure figures, not the capital amounts required to be held against these exposures. Under the Basle framework, required capital for these transactions is equal to 8 percent of the total exposure multiplied by a risk weight that depends on the type of counterparty.

Table 1

How the Basle Accord Measures Potential Credit Exposure

Remaining Maturity of Contract	Interest Rate Contracts (Percent of Notional)	Foreign Exchange Contracts (Percent of Notional)
<1 year	0.0	1.0
≥1 year	0.5	5.0

Notes: The total credit exposure on a derivative contract is equal to the current credit exposure plus the potential credit exposure. The Basle Accord measures potential credit exposure by multiplying the notional amount of the contract by the factors shown in the table. The specific factor used depends on the type of contract and its remaining maturity.

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quarter of 1992 until the end of the third quarter of 1992. That is, current credit exposure increased significantly over each quarter during this period, but not by an amount larger than that already covered by the add-ons at the end of the previous quarter.[10]

Note too that $135 billion of the $143 billion in current credit exposures could, according to Call Report data, be found in ten large institutions as of December 31, 1993. In other words, 94 percent of all current credit exposures to off-balance-sheet derivatives among U.S. commercial banks were concentrated in ten large dealer banks.[11] Although supervisors will obviously monitor all institutions regardless of size, this figure does imply that measures mitigating the credit exposures of dealer institutions will have a very significant impact on aggregate credit exposures.

Closeout netting agreements: Introduction

Closeout netting agreements provide for the exchange of a single net closeout amount for all covered transactions when one counterparty defaults on its derivatives contracts. Closeout netting is now a standard provision in many of the contracts and master agreements that serve as legal documentation for OTC derivative transactions, including the widely used 1992 International Swaps and Derivatives Association Master Agreement.

In April 1993, the Basle Supervisors' Committee released for consultation a proposal that would allow institutions to take bilateral closeout netting agreements into account when calculating current credit exposures.[12] If adopted, this proposal should substantially reduce the magnitude of current credit exposures reported by institutions that participate actively in the OTC derivative market.

Gross exposure vs. net exposure

To see how closeout netting agreements can reduce current credit exposures, consider the following example. A very simple portfolio consists of three contracts, all with the same counterparty (Table 2). Two of the contracts currently have positive market value, while one contract has a negative market value. In the absence of a closeout netting agreement with this counterparty, the applicable measure

[10] Some of the increase in exposures can be attributed to newly initiated instruments, but new instruments often have minimal exposures near the beginning of their lives. Thus, much of the increase in exposure can reasonably be traced to changes in market risk factors (for example, interest rates and exchange rates).

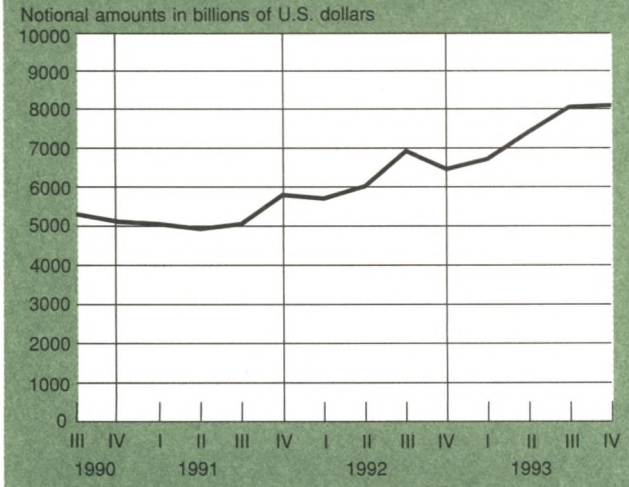
[11] For purposes of comparison, note that the on-balance-sheet loan exposure of these ten institutions was a combined $431 billion as of December 31, 1993.

[12] Basle Supervisors' Committee, *The Supervisory Recognition of Netting for Capital Adequacy Purposes* (Basle, Switzerland, April 1993).

Chart 2

Total Notional Amounts of Off-Balance-Sheet Derivatives for U.S. Commercial Banks

End-of-Quarter Data

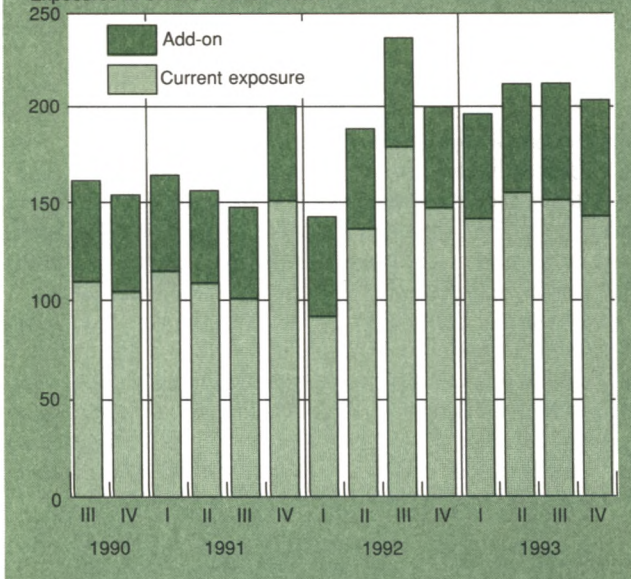


Source: Federal Financial Institutions Examination Council, Reports of Condition and Income, Schedule RC-R.

Chart 3

Credit Exposures of Off-Balance-Sheet Derivatives for U.S. Commercial Banks

End-of-Quarter Data



Source: Federal Financial Institutions Examination Council, Reports of Condition and Income, Schedule RC-R.

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of current credit exposure is the *gross exposure,* which is simply the sum of the replacement costs of the three contracts. The replacement cost of the interest rate swap in this example is zero, since this contract currently has a negative market value. The gross exposure of the portfolio is therefore $30 million.

If a valid closeout netting agreement with this counterparty is in place, however, then *net exposure* is the relevant measure. The net exposure of a portfolio is equal to the sum of the market values of all contracts covered by the netting agreement or zero, whichever is greater. In this example, the sum of the market values (or net portfolio value) is $15 million (10 + 20 - 15). Since this is a positive number, the net exposure of the portfolio is also $15 million. If the sum of the market values had been negative, then the net exposure would have been zero.

Net exposure must, by definition, be no greater than gross exposure. The gross exposure can be thought of as the sum of some number of positive values, while the net exposure will equal the sum of these same positive values as well as some number of negative values. In fact, evidence in the International Swaps and Derivatives Association's public comment on the April 1993 Consultative Proposal indicates that adoption of the proposed revision to the Basle Accord could reduce the magnitude of the reported current credit exposures for dealer institutions by as much as 50 percent.[13] If the add-ons for potential exposure remain unchanged (as would be the case under the April 1993 proposal), then large reductions in the current exposure portion will necessarily imply an increase in the fraction of total exposure that is intended to capture potential exposure.

Do netting agreements reduce potential credit exposures?
Market participants have argued that closeout netting also reduces potential exposure and, consequently, that the add-ons should be reduced to reflect the full benefits of closeout netting. To understand the basis for this claim, recall from the previous section that the need to cover potential exposure arises from the volatility of current credit exposures. That is, larger add-ons are necessary when the volatility of current credit exposures is higher. It may appear that reducing the level of current credit exposures by calculating current exposure on a net basis rather than a gross basis will decrease volatility as well. In fact, however, the reduction in the level of current credit exposure does not guarantee that the volatility is also reduced.

Chart 4 illustrates two possible cases: in one, the intuition about the reduction in volatility is valid, but in the other it is not. The topmost line plots the gross current credit exposure of a hypothetical portfolio over time. The other two lines provide examples of the possible behaviors of the net current exposure of the portfolio. In case A, represented by the solid line, net exposures are lower on average than gross exposures but are approximately equally volatile. That is, the fluctuations in net exposure are nearly as large as the fluctuations in gross exposure. In case B, represented by the dashed line, net exposures are not only lower on average than gross exposures, but are also much less volatile in that the fluctuations of net exposure are significantly smaller than the fluctuations of gross exposure.

Intuition might lead one to believe that case B is closer to the truth than is case A. In fact, however, this issue is substantially more complex than intuition would suggest. The remainder of this article focuses on the factors influencing the volatilities of both net and gross exposures. This analysis can clarify the conditions under which one should expect to observe case A rather than case B and vice versa. This is important because the potential exposure of a portfolio will fall when netting agreements are adopted if and only if the volatility of gross exposures is higher than the volatility of net exposures.

The volatility of net exposure
The net credit exposure of a portfolio of derivative contracts with a single counterparty is equal to either the current market value of the portfolio or zero, whichever is greater. (Unless otherwise indicated, the term portfolio is used in the remainder of the article to refer to a portfolio of contracts with a single counterparty, *not* to the overall portfolio of contracts with all counterparties.) Clearly, then, the

[13] International Swaps and Derivatives Association, *Comment Letter on "The Supervisory Recognition of Netting for Capital Adequacy Purposes"* (New York, December 1993).

Table 2
How Netting Agreements Reduce Current Credit Exposure: An Illustration

Contracts in Portfolio	Value (Dollars)	Replacement Cost (Dollars)
FX forward	10 million	10 million
Interest rate swap	–15 million	0 million
Currency swap	20 million	20 million
Total	Net exposure=15 million	Gross exposure=30 million

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volatility of the net credit exposure will be determined primarily by the volatility of the portfolio's market value. If the portfolio's value fluctuates widely over time, then the net exposure of the portfolio can also be expected to fluctuate widely. Thus, a good starting point for the analysis of the volatility of net credit exposures is to identify the factors that influence the volatility of portfolio value.

First, however, let us clarify what is meant by volatility. Although volatility is often measured by calculating variances or standard deviations, the term simply refers to the tendency of a quantity to vary or fluctuate over time. A highly volatile portfolio has a tendency toward large fluctuations in value over short periods of time. In addition, the volatility itself can vary over time. For example, as some derivative contracts mature and others are added, the tendency of the portfolio to fluctuate in value can change.

What influences the volatility of portfolio value?

Three factors influence the volatility of a derivatives portfolio: (1) the number and size of the contracts in the portfolio, (2) the volatility of each individual contract, and (3) the extent to which contracts move together in response to changing market conditions. The first of these factors is an obvious one, a simple issue of scale. A portfolio with a large dollar volume of contracts is more likely to experience wide fluctuations in dollar value, all else equal, than a portfolio with a smaller dollar volume of contracts. The importance of the second factor should also be intuitively clear. Portfolios that consist of more volatile contracts (for example, foreign exchange contracts) are more likely to exhibit wide fluctuations in value, all else equal, than portfolios that consist of less volatile contracts (for example, many interest rate contracts).

The last of the three listed factors influencing portfolio volatility may not be so obvious, and yet it may be the most important factor of all. This factor refers to the degree to which different contracts in the portfolio respond similarly to changing market conditions. At one extreme, all contracts in the portfolio are identical and respond identically to all possible changes in market conditions. In this case, the portfolio would be described as highly undiversified. A portfolio of this kind will be susceptible to large fluctuations in value since all portfolio components will respond in tandem to changing market conditions.

Diversification and the volatility of portfolio value

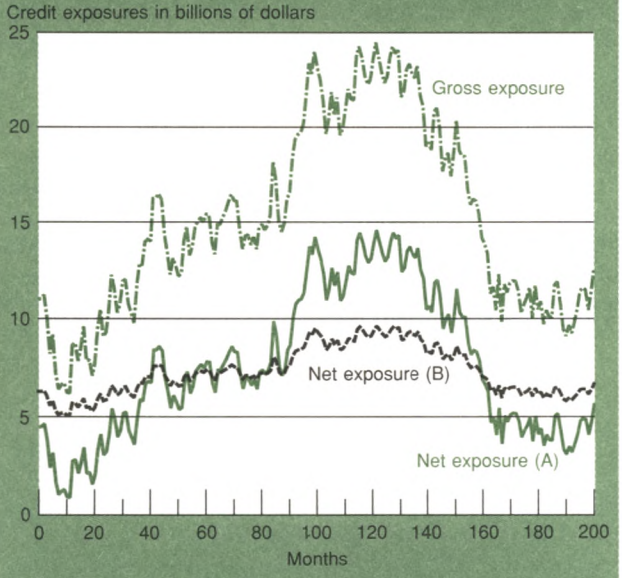
A highly diversified portfolio consists of contracts that do not all move identically in response to changing market conditions. Instead, when some contracts increase in value, others will decrease in value, while still others may be completely unaffected. This diversity of responses to changing market conditions dampens the tendency for the value of the portfolio as a whole to fluctuate widely over time. Thus, the greater the diversity of the portfolio, all else equal, the lower the volatility of the portfolio's value. The logic of this point is, of course, familiar to all who are acquainted with modern portfolio theory.

A portfolio consisting entirely of identical derivative contracts can be thought of as *perfectly positively correlated.* Because all of the contracts respond in exactly the same way to changing market conditions, this portfolio is likely to be quite susceptible to large fluctuations in value. An example of such a high-volatility portfolio would be a portfolio consisting entirely of 100 identical pay-fixed interest rate swaps. This portfolio would gain in value substantially if interest rates moved higher, but would fall in value substantially if interest rates declined.

In a *perfectly hedged* portfolio, each contract is matched by another contract that moves in exactly the opposite fashion when market conditions change. For example, imagine a portfolio consisting of fifty identical pay-fixed interest rate swaps and fifty identical pay-floating interest rate swaps. Apart from whether the swaps are pay-fixed or pay-floating, all features of the two sets of swaps are identical. In this case, an increase in interest rates would increase the value of each pay-fixed swap but would decrease the value of each pay-floating swap by an exactly offsetting amount. A

Chart 4

Possible Effects of Netting on the Volatility of Exposure



Source: Author's calculations.

Notes: Data are illustrative only. The net exposure A series shows a reduction in mean exposure without a corresponding decrease in the volatility of exposure. The net exposure B series shows a reduction in both the mean and the volatility of exposure.

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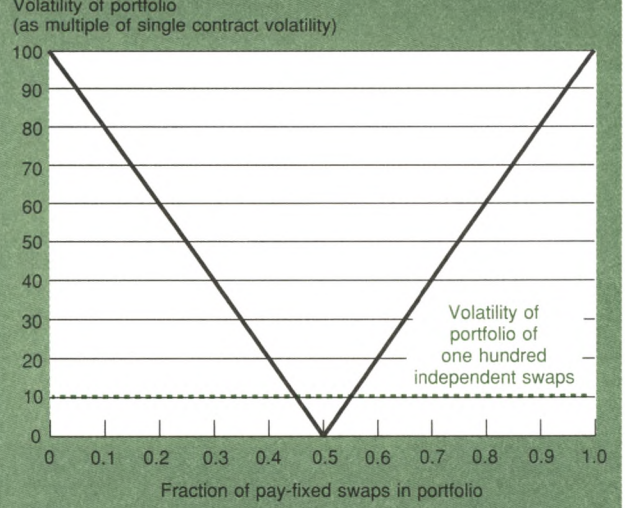
decrease in interest rates would have precisely the opposite effect: the pay-floating swaps would gain in value, but the pay-fixed swaps would decline by an exactly offsetting amount. The volatility of this portfolio would be zero because changes in market conditions could not lead to any net change in portfolio value.

In contrast to a perfectly hedged portfolio, an *uncorrelated* portfolio consists of contracts that move independently of one another. That is, given the response of one contract to changing market conditions, the response of the other contracts is equally likely to be the same or to be different. In principle, derivative contracts on completely unrelated market factors would be uncorrelated. In reality, however, all market factors (including interest rates, exchange rates, and commodity and equity prices) are likely to be related to some extent, making it difficult to provide a realistic example of a portfolio that consists of completely uncorrelated contracts.

Nevertheless, an uncorrelated portfolio can be considered quite well diversified because the contracts in this portfolio will have no special tendency to respond similarly to changing market conditions. Therefore, the volatility of an uncorrelated portfolio would be intermediate between that of a perfectly hedged portfolio and that of a perfectly positively correlated portfolio. An uncorrelated portfolio can thus serve as a useful benchmark for the degree of diversity in a derivative portfolio. In other words, it will be helpful to consider whether a given derivatives portfolio is more or less volatile than an uncorrelated portfolio of the same size.[14]

Chart 5

Volatility of Portfolio Value Relative to the Fraction of Pay-Fixed Swaps



Source: Author's calculations.

Diversification and portfolio balance

Chart 5 plots the volatility of the value of a portfolio consisting of 100 interest rate swaps as the proportion of pay-fixed swaps in the portfolio moves from zero to 100 percent. At the left edge of the horizontal axis, the portfolio consists of 100 pay-floating swaps, so that the portfolio in this case is perfectly positively correlated. Note that the volatility of the portfolio achieves its maximum value at this point. This maximum is also achieved, of course, when the portfolio consists of 100 pay-fixed swaps (the rightmost edge of the horizontal axis).

At the exact center of the horizontal axis, the portfolio consists of fifty pay-fixed swaps and fifty pay-floating swaps. At this point, the portfolio is perfectly hedged: changes in the values of the pay-fixed swaps are exactly offset by changes in the pay-floating swaps. The volatility of the portfolio in this case is therefore equal to zero.

Note that as the portfolio becomes more unbalanced (that is, as one moves away from the center), the volatility of the portfolio rises. This observation is consistent with the idea that as the diversity of the portfolio decreases, the volatility increases. The dashed line in Chart 5 plots the volatility of an uncorrelated portfolio of 100 contracts as a benchmark. In fact, it is apparent that the portfolio of swaps must be well balanced to match or exceed the diversity of the uncorrelated portfolio. Specifically, the proportion of pay-fixed swaps in the portfolio must lie between 45 percent and 55 percent for the swap portfolio to have a lower volatility than the uncorrelated portfolio.

Derivatives portfolios of dealer institutions will obviously be more complex than these examples. In fact, dealer portfolios are likely to include a variety of contract types and to be sensitive to a wide array of market factors beyond interest rates. The basic principles of these simple examples carry over, however, to actual trading portfolios. Particularly relevant is the principle that the greater the diversity of the response to changing market conditions, the lower the portfolio's volatility.[15]

The diversity of dealers' portfolios

Evaluating the volatility of a dealer's derivatives portfolio with a given counterparty therefore requires some knowledge of the degree of diversity among the contracts in the portfolio. Consider first a customer counterparty—for example, a nonfinancial corporation attempting to hedge its exposure to higher interest rates. This corporation might

[14] Additional insights into the mathematical properties of portfolio volatility and its relation to the correlations between contracts in the portfolio are provided in the appendix following the text.

[15] See the appendix for arguments that apply to a variety of contract types.

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wish to be a fixed rate payer and floating rate receiver. Thus, the dealer will enter into interest rate swaps with the corporation so that the dealer is a fixed rate receiver. If this is the only type of derivative contract that the dealer enters into with this counterparty, then the portfolio will lack diversity and the volatility of the portfolio's value will be high (relative to other portfolios of equal size).

Now consider a portfolio with a dealer counterparty. Many dealer institutions attempt to minimize the market risks of their overall portfolios by entering into transactions that offset the market risks of customer-driven transactions. Thus, a dealer who enters into a pay-floating swap to satisfy customer demand will often enter into a pay-fixed swap with another dealer in order to keep the overall swap book well matched from a market risk perspective. If the demand (across all customers) is more or less evenly split between pay-fixed and pay-floating contracts, then the portfolio of contracts with another dealer will also combine pay-fixed and pay-floating contracts.[16]

If this is the case, then the fraction of pay-fixed contracts in the portfolio with another dealer will average approximately 50 percent. Of course, this fraction will not always be precisely 50 percent; sometimes it may be as high as 65 percent and sometimes as low as 35 percent, for example. Recall that Chart 5 shows substantial differences in portfolio volatility as this fraction changes. Thus, if the fraction is exactly 50 percent, the volatility is likely to be very low, while if the fraction is 35 percent or 65 percent, the volatility is likely to be higher.

If portfolios with dealer counterparties tend to have equal mixtures of both types of swaps over time, then it is reasonable to assume that the volatility of the portfolio value varies within a range matching that of the fraction of pay-fixed swaps in the portfolio. For example, if this fraction ranges between 35 percent and 65 percent, then Chart 5 implies a volatility that can range from a low of zero to a high of approximately thirty times the volatility of a single contract.

The likelihood of observing different proportions of pay-fixed swaps in a portfolio that is balanced on average can be assessed through an experiment.[17] The experiment consists of repeatedly choosing 100 swaps at random, with each type of swap (pay-fixed or pay-floating) equally likely to be chosen. The resulting (binomial) frequency distribution of portfolio compositions is depicted in Chart 6. It is plain that only in a very small percentage of cases will such a portfolio be unbalanced to the point where the proportion of pay-fixed swaps falls below 35 percent or rises above 65 percent. In addition, one can prove that the volatilities of the portfolios produced through this experiment will average ten times the volatility of a single contract. Note that this level of volatility is also precisely the volatility of the uncorrelated benchmark portfolio shown in Chart 5.

To summarize, portfolios with dealer counterparties are likely to have relatively even proportions of both types of swaps (pay-fixed and pay-floating). The maintenance of even proportions in turn reduces the volatility of the portfolio's value. If the proportions are perfectly balanced in the long run but are allowed to fluctuate randomly in the short run, then the amount of portfolio volatility will, on average, equal the volatility of a portfolio of uncorrelated contracts. Of course, dealers may wish to reduce portfolio volatility further by actively managing the portfolios to keep them closely balanced even in the short run.[18]

The volatility of gross exposure

The previous section dealt with the volatility of net exposures by focusing on the factors influencing the volatility of net portfolio value. This section is concerned with the volatility of gross exposures. Recall that gross exposure is the applicable measure of current credit exposure in the absence of netting agreements, so that if the volatility of gross exposures exceeds that of net exposures, the potential exposure of a portfolio will fall when netting is implemented.

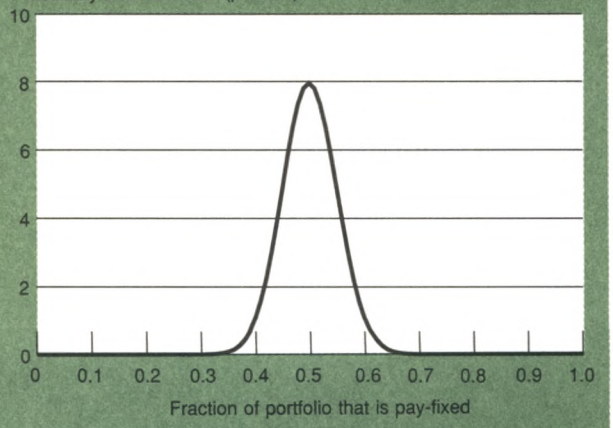
[16] One need not assume that each customer deal is microhedged with an exactly offsetting transaction. The same logic also applies when interdealer transactions are used to hedge the residual exposures resulting from multiple customer transactions.

[17] A portfolio that is balanced on average will not persistently favor one type of swap (pay-fixed or pay-floating) over another. This does not imply perfect balance at every point in time, however.

[18] Chart 5 points up the possible benefits of this strategy. The tighter the fluctuations in the fraction of pay-fixed swaps around 50 percent, the lower the volatility of the portfolio on average.

Chart 6

Probability Distribution of Fraction of Pay-Fixed Swaps in a Portfolio That Is Balanced on Average



Source: Author's calculations of binomial probability distribution.

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Gross exposure and in-the-money contracts

While the volatility of net exposure is closely related to the volatility of the portfolio's overall, or net, value, the volatility of gross exposure behaves somewhat differently. To understand this, recall that the calculation of gross exposure essentially ignores all contracts that currently have negative value. Because these contracts, known as out-of-the-money (OTM) contracts, have zero replacement costs, they do not add to or subtract from the gross exposure of the portfolio. Rather, it is only the in-the-money (ITM) contracts that have positive replacement costs and therefore add to gross exposure.

The distinction between ITM and OTM contracts is of crucial importance in assessing the volatility of gross exposure. The reason is that movements in gross exposure will largely be the result of changes in the values of contracts that are currently ITM.[19] The ITM subset of contracts will often differ substantially in composition from the set of all contracts with a given counterparty. In other words, the volatility of gross exposure can differ from the volatility of net exposure because the volatility of gross exposure is influenced by the properties of a special subset of contracts, whereas the volatility of net exposure is influenced by the properties of all contracts with a counterparty taken together.

Although the volatility of gross exposure is affected primarily by the properties of the ITM subset rather than the whole portfolio, it has the same three determinants as the volatility of net exposure: (1) the number and size of the contracts in the ITM subset,[20] (2) the volatility of each individual contract, and (3) the extent to which contracts move together in response to changing market conditions.

The first two of these factors will have much the same influence on gross exposures as on net exposures, but the third factor must be examined more carefully. The extent of diversity among contracts overall may not be a reliable guide to the extent of diversity among the contracts in the ITM subset, as the following example suggests.

The diversity of in-the-money contracts

Table 3 decomposes the contracts in an interest rate derivatives portfolio along two dimensions. The two rows in the table decompose contracts into those that are pay-fixed and those that are pay-floating. The two columns of the table decompose contracts into those that are currently ITM and those that are currently OTM. Every interest rate contract with a given counterparty falls into one of the four cells of the table, labeled A–D. The contracts in cells A and D have contractual fixed rates below prevailing interest rates, so that pay-fixed contracts (cell A) are ITM and pay-floating contracts (cell D) are OTM. The contracts in cells B and C are in the reverse situation because the contractual fixed rates for these contracts are above prevailing interest rates.

Consider a counterparty portfolio that has equal numbers of pay-fixed and pay-floating contracts. The arguments of the preceding section suggest that the volatility of the portfolio's value, and thus the volatility of its net exposure, would be very low, possibly even zero. This same conclusion does not apply to the volatility of the gross exposure, however. Because the volatility of gross exposure is a function only of the contracts in the ITM subset (those in the left column of Table 3), it depends exclusively on the balance of contracts between cells A and C, not on the overall balance of the portfolio.

If cell A has many more contracts than cell C, then the ITM subset has many more pay-fixed contracts than pay-floating contracts. In this case, a large increase in interest rates will lead to a substantial increase in the value of the pay-fixed contracts and a substantial decrease in the value of the pay-floating contracts. Under the assumption that cell A has many more contracts, however, the gross exposure of the portfolio will also rise substantially as the increases overwhelm the decreases. Exactly the opposite will occur if cell C has many more contracts than cell A. But if cell A happens to have approximately as many contracts as cell C, the gross exposure of the portfolio will not tend to move substantially in reaction to changes in interest rates, since increases in some contracts will be offset by decreases in others.

Thus far, the arguments in this section have suggested two important conclusions. First, the volatility of gross exposure will be primarily determined by the diversity of contracts in the ITM subset. Second, the diversity of the counterparty portfolio overall is not a reliable guide to the diversity of contracts within the ITM subset. The next step is to identify the factors that influence the diversity of contracts in the ITM subset.

Historical interest rates and the composition of the in-the-money subset

Consider once again a portfolio that is perfectly balanced between pay-fixed and pay-floating swaps. Imagine that the portfolio is constantly adding new swaps at different contractual rates, but that whenever a pay-fixed swap is added, a pay-floating swap with the same terms is added as well. This portfolio will be perfectly hedged as a whole. The ITM subset will not in general be perfectly hedged, however.

If interest rates have been rising steadily for some time, then prevailing interest rates will likely be above the contractual rates of all of the contracts in the portfolio. This sce-

[19] Obviously, some ITM contracts become OTM and vice versa over any given time horizon. However, simulation evidence not presented here suggests that these effects are sufficiently small that they do not affect the arguments made in the text.

[20] It might seem that the dollar volatility of gross exposure must be lower than that of net exposure since the ITM subset is likely to include fewer contracts than the portfolio overall. This factor is offset, however, by the fact that the net exposure will be zero some fraction of the time, lowering the dollar volatility of net exposure by approximately the same extent.

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nario implies that most of the contracts in the portfolio will be located in cells A and D of Table 3. In other words, the swaps in cell A will far outnumber those in cell C. If, on the other hand, interest rates have been falling steadily, then most contracts will be in either cell B or cell C, leaving cell A with far fewer swaps than cell C. Finally, if prevailing interest rates are near the middle of the different contractual rates in the portfolio, then a balanced division of swaps between cells A and C is likely.

It should be apparent, then, that the path of interest rates over time will influence the relative numbers of swaps in cells A and C, and hence the volatility of gross exposure. The greater the imbalance in the number of contracts in these two cells, the greater the volatility of gross exposure. This effect is the same as that depicted in Chart 5 — namely, that a large imbalance between the two types of swaps can result in a portfolio (in this case, a subset) with high volatility.[21]

Some insight into the probable balance between cells A and C can be gained by using historical interest rate data to simulate the behavior of a hypothetical interest rate swap portfolio over time. The results of this experiment are presented in Chart 7. The experiment consists of using U.S. interest rate data to track the value of a hypothetical swap portfolio over the period from 1959 to 1992.[22] The swap portfolio adds new matched pairs (that is, both pay-floating and pay-fixed contracts) of one-year, two-year, three-year, four-year, and five-year swaps each month. After five years, the portfolio composition reaches a steady state: sixty pairs of swaps that were originally five-year swaps, forty-eight pairs that were originally four-year swaps, thirty-six pairs that were originally three-year swaps, twenty-four pairs that were originally two-years swaps, and twelve pairs that were originally one-year swaps. The distribution of swaps by *remaining* maturity will be staggered; for example, at any given time there will be five pairs with one month remaining and only one pair with fifty-four months remaining. The greater concentration of swaps with shorter remaining maturities is consistent with the composition of typical interdealer portfolios.

Since the portfolio consists of matched pairs of swaps, precisely 180 swaps will always be ITM.[23] The proportion of these that are pay-fixed will change over time, of course, as interest rates change. Chart 7 depicts the resultant frequency distribution of the fraction of the ITM swaps in the portfolio that are pay-fixed. In other words, it plots the frequency distribution of the fraction of the ITM swaps that fall into cell A. Chart 7 makes it clear that this fraction will quite often be far from 50 percent. In fact, the frequency distribu-

[21] Note that this phenomenon can lead, under certain circumstances, to gross exposure that is less volatile than net exposure. This outcome could occur, for example, in a portfolio that consists primarily of pay-fixed swaps with a small number of pay-floating swaps. Although the portfolio is not very diverse overall (implying high volatility of net exposure), a steep drop in interest rates could render most, but not all, of the pay-fixed swaps OTM. Thus, the ITM subset would consist of roughly equal numbers of pay-fixed and pay-floating swaps and would therefore be relatively well diversified.

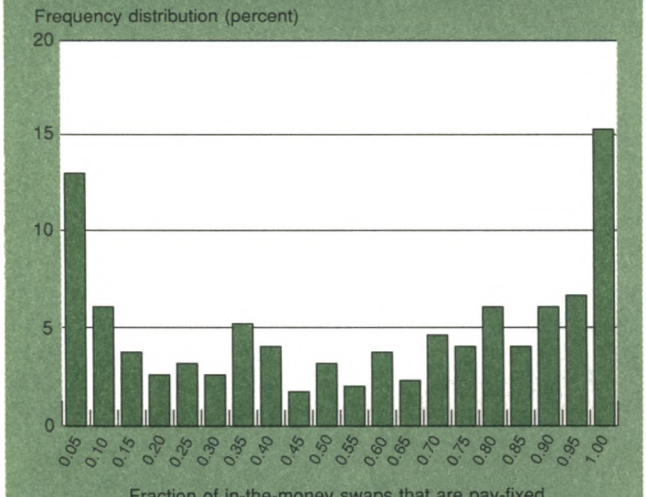
[22] Yields for months 1-6 are drawn from the six-month Treasury bill yield file and yields for months 12, 24, 36, 48, and 60 are from the Fama-Bliss discount bond file, both from the Center for Research in Security Prices bond file. Linear interpolation is used to determine other zero-coupon yields. These data are used to construct the pure discount-bond term structure needed to price and value interest rate swaps.

[23] In other simulations, not reported here, the portfolio contained a random mixture of pay-fixed and pay-floating swaps. The behavior of the ITM contracts in these simulations was virtually identical to the behavior of the ITM contracts in the perfectly matched portfolio.

Table 3
Decomposition of Interest Rate Swap Portfolio

	In-the-Money (Positively Valued)	Out-of-the-Money (Negatively Valued)
Pay-fixed	A Contractual rates below current rates	B Contractual rates above current rates
Pay-floating	C Contractual rates above current rates	D Contractual rates below current rates

Chart 7
Frequency Distribution of Fraction of In-the-Money Swaps That Are Pay-Fixed



Source: Author's calculations.

Notes: Values are calculated using historical U.S. term structures for a hypothetical swap portfolio over the period 1959-92. Reported frequencies cover a range of 0.05 ending with the labeled value.

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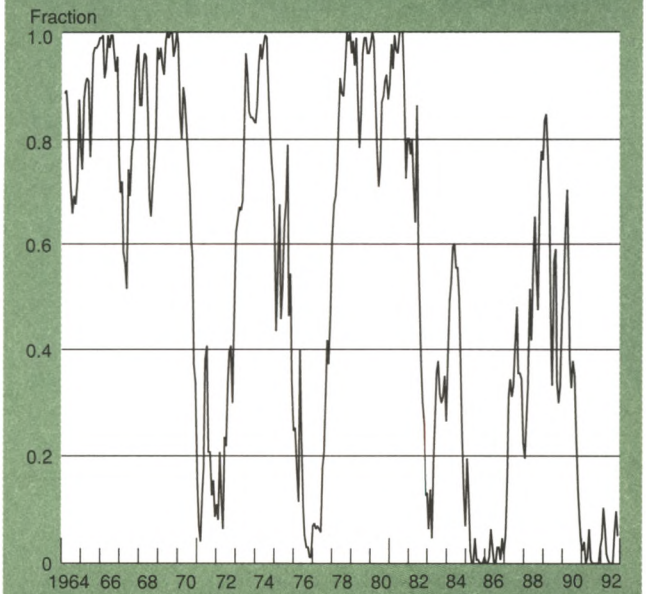
tion spikes at both endpoints, indicating a substantial likelihood that the ITM subset will be significantly unbalanced. In such instances, the volatility of gross credit exposure will therefore tend to be particularly high.

Moreover, the proportion of the ITM subset that is pay-fixed can also change rapidly over short periods of time, implying rapid fluctuations in the volatility of gross exposure. Chart 8 depicts the time series of this proportion for the above experiment. The speed of changes in this proportion is clearly evident in Chart 8: witness the hypothetical increase from near zero percent to almost 100 percent from mid-1977 to mid-1978 that would have been caused by increases in prevailing interest rates.

When the ITM subset is significantly unbalanced, the volatility of gross exposure will be significantly higher than when the ITM subset is balanced. This experiment makes it plain that periods of high volatility of gross exposure are likely to be common, even for a portfolio that is perfectly matched overall. This finding confirms that the volatilities of net and gross exposures are subject to separate influences, and that the extent of diversity in the portfolio as a whole does not provide a reliable indicator of the extent of diversity in the ITM subset.

Chart 8

Fraction of In-the-Money Swaps That Are Pay-Fixed



Source: Author's calculations.

Notes: Values are calculated using historical U.S. term structures for a hypothetical swap portfolio over the period 1959-92.

Conclusions

This article analyzes the factors influencing the volatilities of both net and gross credit exposure, primarily to determine whether the volatility of net exposure is lower than the volatility of gross exposure. This question, however, is complicated by the fact that the volatilities of both gross and net credit exposures are likely to vary considerably over time, depending on the extent to which contracts move together in response to changing market conditions.

If current credit exposure is measured on a *net* basis (that is, a netting agreement is in place), then the volatility of current credit exposure will depend on the degree to which *all* contracts with a counterparty move together. This will largely be a function of the extent to which the portfolio of contracts is balanced between one side and the other (for example, pay-fixed as opposed to pay-floating swaps). If interdealer portfolios do not systematically favor one side over the other, then it is unlikely that they will become extremely unbalanced simply by chance.

If current credit exposure is measured on a *gross* basis (that is, no netting agreement is in place), then the volatility of current credit exposure will primarily depend on the degree to which the ITM contracts with a counterparty move together. Even if the overall portfolio of contracts with a counterparty is well balanced, the subset of ITM contracts will often be extremely unbalanced because of the effects of changing market conditions.

The volatility of gross credit exposure is therefore likely to vary over a wider range than will the volatility of net credit exposure. This conclusion implies that while the volatility of gross credit exposure will sometimes be similar to the volatility of net exposure, it can also be expected to exceed the volatility of net exposure at some points. Thus, on average, the volatility of gross exposure is higher than that of net exposure.

In summary, this analysis points to significant benefits from legally valid closeout netting agreements. First, netting agreements unequivocally lead to reductions in current credit exposures, which make up the bulk of total credit exposures. Second, under certain circumstances, netting agreements reduce fluctuations in the volatility of the credit exposures of dealer institutions, thereby lowering the volatility of the institutions' credit exposures on average. Netting agreements can therefore lead to reductions, on average, in potential credit exposures, the second major component of total credit exposures to OTC derivatives.

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Appendix: Assessing the Volatility of a Derivatives Portfolio

This appendix develops a simple mathematical formula that can be used to assess the volatility of a portfolio of derivative contracts. The assumptions underlying the formula are as follows:

(1) There are N contracts in the portfolio.
(2) The distribution of the change in the value of each individual contract is normal, with a mean of zero and a standard deviation given by σ (the same for all contracts).
(3) The correlation between the changes in the values of any two contracts in the portfolio is given by ρ_{ij}.

Under these assumptions, the volatility (standard deviation) of the change in portfolio value will be given by the following equation:

$$(1) \qquad \sigma_{Portfolio} = \sigma \sqrt{N + 2 \sum_{i=1}^{N} \sum_{j=i+1}^{N} \rho_{ij}} \quad .$$

The portfolio volatility therefore rises proportionately with the volatility of the individual contracts, σ. Inside the square root, the first term (N) represents the contribution of the variances of the individual contracts, while the double summation represents the contribution of the covariances across contracts. Note that there will be a total of $(N^2-N)/2$ terms in the summation.

It is clear from equation 1 that values of the individual ρ_{ij}'s affect the portfolio volatility only through their sum. It is thus convenient to work with a quantity that can be termed the "average correlation":

$$(2) \qquad \bar{\rho} = \frac{\sum_{i=1}^{N} \sum_{j=i+1}^{N} \rho_{ij}}{(N^2-N)/2} \quad .$$

Intuitively, the average correlation represents the average degree to which any pair of distinct contracts will be correlated. The average correlation thus constitutes a proxy for the degree of diversification across the entire portfolio. The higher the average correlation, the lower the diversity of the portfolio. With this notation, equation 1 can be rewritten as follows:

$$(3) \qquad \sigma_{Portfolio} = \sigma \sqrt{N + (N^2 - N)\,\bar{\rho}} \quad .$$

From equation 3, it follows that there are three major influences on portfolio volatility—N, σ, and $\bar{\rho}$. These three variables correspond to the three factors discussed in the text of the article.

With respect to the volatility of net credit exposure, N would equal the total number of contracts in the portfolio and $\bar{\rho}$ would refer to the average correlation across all of these contracts. In this context, note that the volatility of net credit exposure will be less than the volatility of the change in net portfolio value because the net portfolio value will often be negative, leading to zero net credit exposures.†

With respect to the volatility of gross credit exposures, N would equal the number of ITM contracts in the portfolio, and $\bar{\rho}$ would refer to the average correlation across this subset of contracts only. Clearly, this calculation abstracts from the possibility that contract values would change sign over the time horizon of interest. Simulation results that do not ignore this possibility indicate that the approximation error is not great, however.‡

The value taken on by $\bar{\rho}$ in equation 3 is in many respects the crucial determinant of portfolio volatility. If $\bar{\rho}$ equals one, then the portfolio is perfectly positively correlated and has a volatility of σN. If $\bar{\rho}$ equals zero, then the portfolio is uncorrelated and has a volatility equal to $\sigma\sqrt{N}$. A perfectly hedged portfolio has a volatility of zero. In this last case, $\bar{\rho}$ will achieve its minimum possible value of $-1/(N-1)$. Although two variables can have a correlation as low as -1, it is not possible for all N variables to have a correlation of -1 with each of the other variables.

† The variance of net exposure will be approximately one-half of the variance of net portfolio value under the assumptions listed above, leading to a reduction of approximately 30 percent in the standard deviation.

‡ Darryll Hendricks, "Netting Agreements and Potential Credit Exposure," January 1994. Copies are available from the author upon request.

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How Lower Japanese Asset Prices Affect Pacific Financial Markets

by Robert N. McCauley and Stephen Yeaple

Soaring asset prices in Japan allowed Japanese banks and life insurers to expand their international activity very rapidly in the late 1980s. Supported by cheap and plentiful capital at home, Japanese banks sought to increase their market share around the world. At the same time, Japanese insurance companies took advantage of increasing gains on domestic share holdings to invest aggressively in foreign securities.

The collapse of Japanese asset prices in the 1990s sharply reduced the wealth of these financial intermediaries and slowed their international activity. Japanese banks lost access to equity markets, while insurance companies lost the cushion of unrealized gains that made investment in risky foreign bonds possible (Chart 1).

This article examines the response of Japanese banks and insurers to the Nikkei's decline. It investigates how lending and investment strategies have changed with the loss of stock market wealth and considers the effect of these changes on international markets.

Growing international wealth and shrinking international intermediation

The fall in Japanese asset prices has affected Japan's financial relations with the rest of the world in contradictory ways. During the 1980s, high asset prices enriched households and firms, boosting consumption and especially capital spending. As a result, Japan's surplus in trade with the rest of the world narrowed. Lower asset prices in the 1990s have led to a widening of Japan's trade surplus, causing the country's *net* international investment position to grow faster in the 1990s than in the late 1980s (Chart 2). At the same time, because lower asset prices have reduced the capacity of Japanese banks and insurers to take on the risks of international intermediation, the growth of Japan's *gross* international assets and liabilities has decelerated sharply.

In the 1980s, Japan's international financial activity expanded well in excess of the country's current account surpluses. Japan ran sizable current account surpluses as exports of merchandise exceeded imports of merchandise, tourist spending abroad, and foreign aid. The inflows associated with these surpluses found their match and more in strong outflows of long-term capital: purchases of foreign bonds and stocks by insurance companies and direct foreign investment by industrial firms. Japanese banks borrowed dollars from banks in Hong Kong, Singapore, and London to bring home to finance foreign security purchases that outran the current account surplus (Table 1). At the same time, Japanese banks expanded outside of Japan through transactions that never touched the country. Japanese banks sought deposits in the interbank markets to fund loans first to Japanese firms' subsidiaries abroad, and then to U.S., European, and Asian firms.[1]

With the decline of the Nikkei, the long-term capital outflows from Japan, both portfolio and direct investments, have fallen off, and foreign investors have intermittently found Japanese bonds and stocks attractive. Yet logic and an accounting identity tell us that some outflows must correspond to the surpluses on the Japanese current account.

In fact, Japanese banks have responded to the changing flows in the goods and securities markets by becoming net providers of funds to the international banking system. That is, Japan's widening current account surplus and declining

[1] Rama Seth and Alicia Quijano, "Japanese Banks' Customers in the United States," Federal Reserve Bank of New York *Quarterly Review*, vol. 16 (Spring 1991), pp. 79-82. The direct investment outflows on Chart 1 are understated by the growth of Japanese bank equity in effect committed to but not counted as supporting the activity of foreign branches.

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purchases of foreign bonds and stocks have been accommodated by a massive swing from inflows to outflows of funds through the Japanese banking system (Table 1). This shift parallels the change in Japanese banks' multinational operations from rapid growth to downsizing.

Reconciling growing international wealth and shrinking international intermediation turns on the difference between net international wealth and gross international wealth. The current account surplus adds to Japan's net international wealth some $100 billion per year. When the stock market was booming, Japan's financial institutions were leveraging this growing wealth by borrowing short-term and lending long-term in foreign currency. Lower stock market and land wealth has slowed the rise of Japan's gross assets to a rate below that of Japan's net assets (Chart 2). Japan as a trading nation is still accumulating foreign assets while Japan as a financial nation is consolidating.

The Nikkei and Asian banking markets

The fall of the Nikkei has tightened constraints on Japanese banks by reducing bank capital. Lower share prices have reduced Japanese banks' capital directly because the banks are major holders of industrial firms' shares. Japanese city banks hold shares that sum in market value to the banks' own economic wealth (or capital—that is, shareholders' equity plus unrealized gains on their equity portfolio). Other Japanese banks' exposure to the Nikkei average is greater than that of the city banks: the market value of Japanese long-term credit banks' and trust banks' shareholdings well exceeds their economic wealth. Overall, the decline in the Tokyo stock market (Chart 1) has approximately halved Japanese banks' economic wealth.

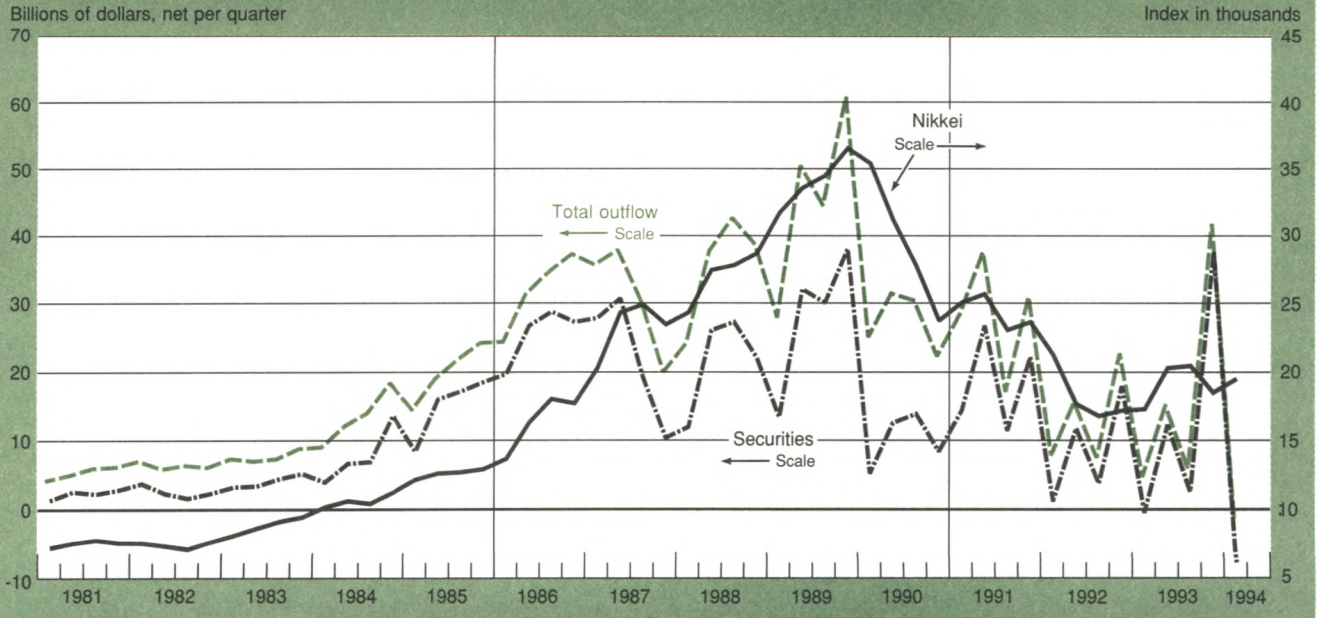
Japanese banks' loss of capital bore immediate consequences for their growth. The Basle Accord on the regulation of international banking requires adequate capital to back bank assets.[2] When the outline of the international agreement became apparent in 1987, Japanese bankers chose to slow foreign asset growth from a 50 percent per year pace. At the same time, however, the rising Nikkei permitted Japanese banks to sell their own shares and to realize capital gains on their customers' shares. Consequently, the banks continued to grow assets at double-digit rates and thereby gained market share.[3] But when the fall of the

[2] Raj Bhala, *Perspectives on Risk-Based Capital* (Bank Administration Institute, 1989).

[3] See Steven A. Zimmer and Robert N. McCauley, "Bank Cost of Capital and International Competition," Federal Reserve Bank of New York *Quarterly Review*, vol. 15 (Winter 1991), pp. 33-59.

Chart 1

Purchases of Long-Term Foreign Assets by Japanese Residents



Source: Bank of Japan, *Balance of Payments Monthly*.

Note: The difference between total and securities outflow is mostly direct investment but also includes trade credits and other loans.

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Nikkei reduced capital, concerns for capital adequacy assumed new urgency, forcing Japanese banks to cease their international expansion.

The decline in Japanese share prices has introduced another constraint: a higher cost of capital. In the 1980s the Tokyo Stock Exchange valued a given stream of Japanese bank earnings at a multiple much higher than any other stock market accorded the earnings of its respective banks. Japanese bank managers could therefore target a return on assets well below that required by the international competition and still satisfy their shareholders' demands. For instance, a Japanese bank could target no more than a 20 basis point spread to cover its capital costs on a U.S. corporate loan, while a U.S. bank required 70 basis points or more.[4]

The decline in the Nikkei has eliminated the cost of equity advantage of Japanese banks. The Tokyo Stock Exchange continues to assign Japanese banks' reported earnings a high multiple, but those earnings are depressed by the cost of write-offs of troubled loans to real estate and nonbank financial firms. More tellingly, Japanese banks, along with the rest of corporate Japan, have lost access to the equity market for new issues of common shares.[5] As a result, in current circumstances, Japanese bank managers must now target a higher return on assets to build capital from internal sources (and to convince their shareholders to buy shares again at some point).

If the cost of equity rises for banks from a small country, their choices in international banking markets are fairly circumscribed. If they move into higher yielding loans, they risk losing equity to loan losses and facing an even higher cost of equity as equity investors come to appreciate the portfolio shift. But banks from a large country that command a substantial share of the international banking market help set the terms of the trade-off between risk and return in international banking. The predominance of Japanese banks in international banking by the end of the 1980s meant that less aggressive bidding on their part could widen spreads for a borrower of a given riskiness.

The fall of Japanese asset prices has therefore created new challenges for Japanese bank managers. Managers can no longer rely on an easy growth of capital to support rapid balance sheet growth and a low cost of equity to support a pricing strategy designed to win market share. Japanese banks have had to alter their business strategies globally to accommodate the new constraints on their activities (Figure 1).

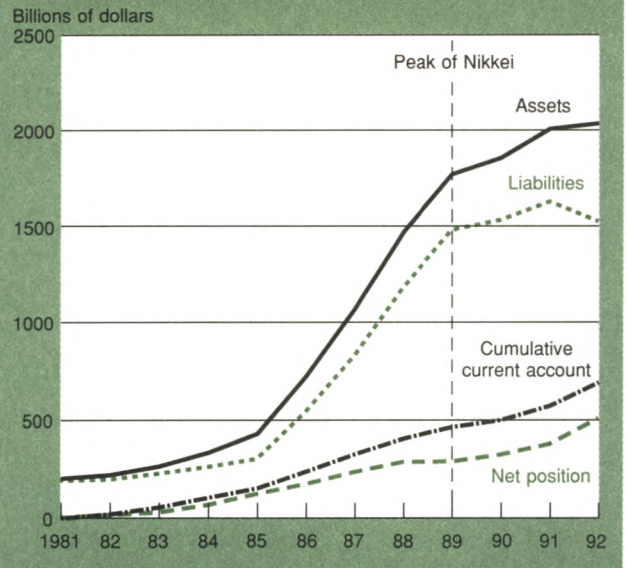
The fall of the Nikkei has resulted in a rapid downsizing of Japanese banks' international operations: by mid-1993, Japanese banks had reduced their international assets by 30 percent and had cut their share in BIS reporting banks'

[4] Zimmer and McCauley, "Bank Cost of Capital," p. 47.

[5] The first Japanese bank has taken advantage of a new possibility of selling preference shares in Tokyo. Hiroyuki Nishimura, "Banks Give Up Plans for Preferred Stock," *Nikkei Weekly*, May 23, 1994, p. 16.

Chart 2

Japan's International Balance Sheet



Source: Bank of Japan, *Balance of Payments Monthly*.

Table 1

Japan's Balance of Payments

Annual Averages in Billions of Dollars

	1987–89	1991–93
Current account	74.6	107.3
Private long-term capital	–119.0	–23.2
Net direct investment	–32.7	–19.1
Japanese purchases of foreign securities	–96.0	–53.4
Foreign purchases of Japanese securities	+33.1	+37.5
Private short-term capital	63.0	–76.3
Bank foreign currency	45.9	–7.9
Bank yen	–4.3	–52.6
Decreases in deposits	63.3	–46.4
Increases in loans	–67.6	–6.2
Official flows	–11.0	–1.7
Errors and omissions	–7.7	–6.2

Source: Bank of Japan.
Note: Subcategories of private long-term and short-term capital are not exhaustive.

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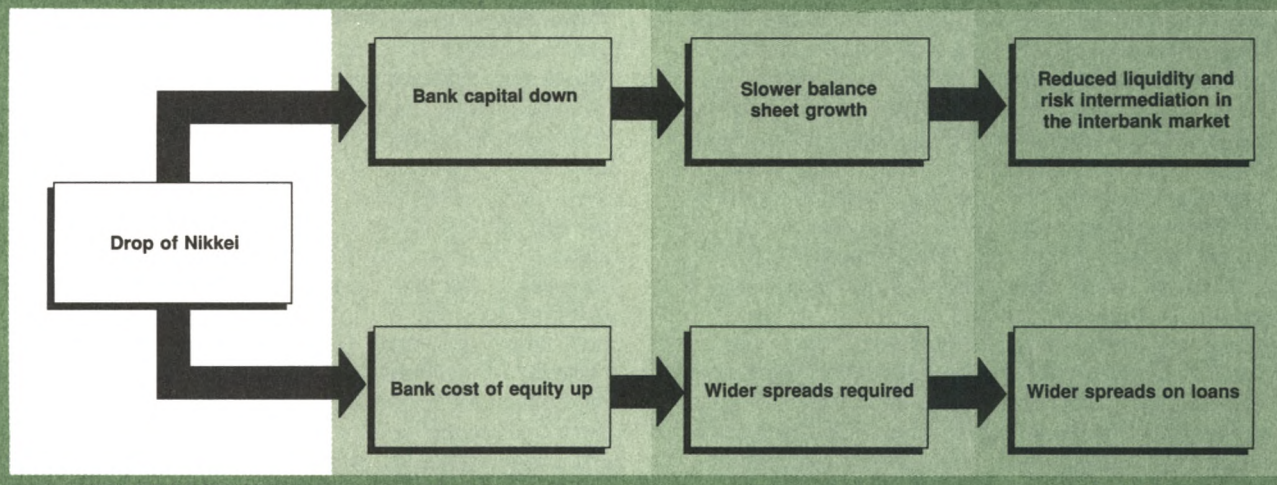
Figure 1

Effect of Drop in Nikkei on Bank Credit Market



international assets by 7 percentage points to 27 percent.[6] The downsizing shows up in two markets: the interbank market and the market for corporate and sovereign loans.

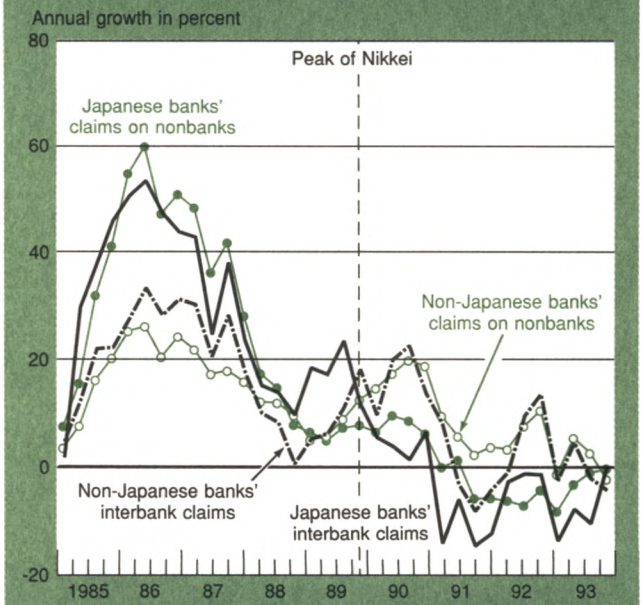
The slowdown in interbank market growth

The mid-1980s saw very rapid growth in Japan's international interbank assets (Chart 3). Japanese banks then slowed the growth of their assets in 1988 in response to the Basle Accord. Double-digit growth remained feasible, however, as Japanese banks sold equity and realized gains by selling and repurchasing crossheld shares.

As noted earlier, the constraint of the Basle Accord began to bind tightly after the Nikkei tumbled in 1990. Japanese banks then reduced the growth of interbank claims abroad to single-digit rates, well below aggregate interbank market growth. Although interbank assets attract a relatively low risk weighting under the Basle Accord (a weight of 0.2 compared with a weight of 1 for a commercial loan), they yield little, contribute negligibly to bank business strategies, and perform functions that off-balance-sheet instruments can reproduce at lower capital charges.[7] After the Nikkei sank further in 1991, Japanese banks lightened

Chart 3

International Claims by Nationality of Bank



Source: Bank for International Settlements.

Note: Chart shows assets of banks in reporting countries only.

[6] Bank for International Settlements, *International Banking and Financial Market Developments*, October 1993, p. 5. The 30 percent figure is adjusted for exchange rate changes.

[7] *Recent Innovations in International Banking* (Basle: Bank for International Settlements, 1986).

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their balance sheets by running off more interbank placements, leading to an unprecedented (in the postwar period at least) global decline in the interbank market.[8]

Japanese banks felt other pressure to reduce their presence in the world interbank market. As they lost wealth and experienced a rise in troubled loans to real estate and finance companies at home, their credit standing abroad declined. As a result, international banks became more cautious in placing deposits with Japanese banks. With less access to interbank liabilities, Japanese banks had further cause to reduce interbank assets.

The retrenchment of Japanese banks in global interbank markets left its mark even in the Asian offshore banking centers that serve the world's fastest-growing region. Banks in Hong Kong and Singapore, including banks from Japan, show no growth in their claims on banks abroad in the 1990s (Chart 4).

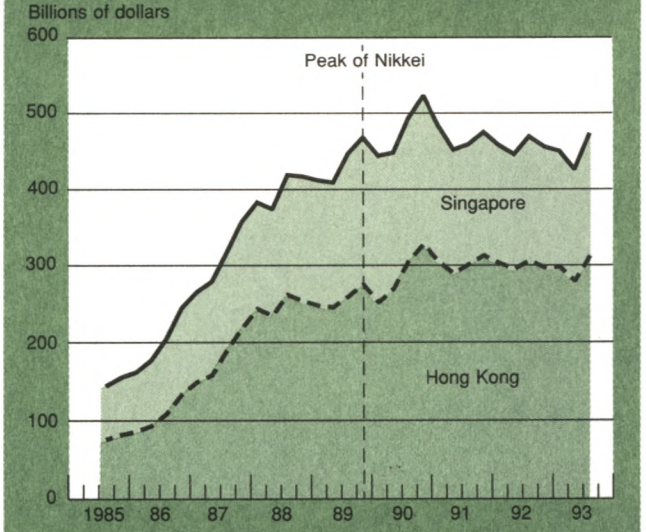
The consequences of Japanese retrenchment for Pacific countries stem largely from one of the primary roles of the international interbank market: bank credit risk intermediation. This intermediation arises because depositors prefer certain banks for reasons of credit and habit while other banks less favored by depositors find lending opportunities that outpace their deposit growth. Although depositors typically want to hold claims on the safest of banks, such a prime bank may have no use for these deposits. Thus, the prime bank places the funds with an intermediary bank that onlends to a less creditworthy bank. The prime bank favored by depositors might not wish to have a claim on the third bank, but the chain of deposits has indirectly afforded the third bank access to the prime bank's funds.[9] While Japanese banks might be found in all links of such a chain, they were generally in the middle during much of the 1980s (Figure 2, left side).

The Japanese withdrawal from this intermediary role poses a challenge for the external funding of fast-growing Asian borrowing countries. These countries have depended heavily on the interbank market for their international finance. Banks in Korea, Malaysia, and Thailand that borrow from banks abroad and onlend to domestic customers account for two-thirds or more of these countries' external bank debt, and banks in Indonesia account for a third of the country's external bank debt. These banks occupy the third-tier position in our stylized description of the interbank market; they rely on Japanese banks, in the second tier, for funding. Now that Japanese banks are retrenching, banks from elsewhere in Asia need to step into the second tier. To do so, they need to meet the capitalization, disclosure, and accounting standards of the first-tier banks.

[8] Bank for International Settlements, *62nd Annual Report*, 1992, p. 161.

Chart 4

External Interbank Assets of Asian Offshore Centers



Sources: *Hong Kong Monthly Digest of Statistics*; Monetary Authority of Singapore, *Monthly Statistical Bulletin*.

The widening of banking margins for sovereigns and firms

The market for corporate and sovereign loans provides further evidence that the Nikkei's collapse has led Japanese banks to change their international strategies. The rising cost of equity may have prompted Japanese banks to widen the margin between deposit and lending rates for foreign borrowers. To be sure, Japanese banks have widened their margins for domestic borrowers,[10] but may have done so only because they perceived greater risk in their borrowers' finances owing to slow growth.

A look at average spreads on internationally syndicated loans (Chart 5) shows no break between the 1980s and 1990s. The most marked change is a widening of spreads that coincides roughly with the agreement on the Basle Accord. But such evidence can mislead owing to shifts in composition of the borrowers. For instance, the best Korean names dropped out of the syndicated loan market in 1988-89.

[9] Steven V.O. Clarke, *American Banks in the Interbank Market* (New York: New York University Graduate School of Business Administration, 1984); and Robert Z. Aliber, "External Shocks and U.S. Domestic Financial Stability," in *The Search for Financial Stability: The Past Fifty Years* (San Francisco: Federal Reserve Bank of San Francisco, 1986), pp. 87-107.

[10] Kunio Okina and Chihiro Sakuraba, "Balance Sheet Adjustments and Interest Rate Policy in Japan," paper prepared for the autumn meeting of central bank economists at the Bank for International Settlements, Basle Switzerland, November 16-17, 1993.

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A different picture emerges from the terms offered to individual borrowers: flagship borrowers from Korea, Thailand, and Indonesia appear to face wider spreads on syndicated loans starting in 1990 and 1991 (Table 2). The timing of the increase in spreads is consistent with the thesis that the higher cost of equity for Japanese banks has led to a widening of their required spreads and thereby to wider observed spreads in banking markets around the Pacific.

This widening of spreads does not reflect deteriorating credit quality (Table 3). The credit standing of these countries suffered no deterioration—with the partial exception, perhaps, of Indonesia. Moreover, these economies continued to grow strongly in the early 1990s, so the wider spreads cannot be interpreted as an expression of higher borrower risk in a recession (as can the parallel widening of spreads to prime U.S. corporations in the same period).

The shift in loans toward Asia

Although Japanese banks have reduced their international lending overall, they have chosen to pursue moderate growth in Asian assets. A representative of a major Japanese city bank, explaining this change in the pattern of overseas lending, noted that the "Asia-Pacific" region offered "better risk/return relationships" than Europe or North America.[11] Another banker contrasted his bank's experience with problem U.S. property and leveraged loans to comparatively "sound" loans in Asia. He reported that his bank was increasing its Asian exposure by 3 to 4 percent per year despite static overall international operations.[12]

The distribution of assets across Japanese banks' foreign branches confirms this shift (Chart 6). The share of overseas assets booked in London has been falling since 1988 and the share booked in the United States has been falling unevenly since 1989. Meanwhile, the share booked in Hong Kong has been rising.

Notwithstanding the strategic reallocation toward Asia, Japanese banks claim a smaller market share in the region's banking markets. Japanese banks no longer occupy the first position that they gained in the 1980s among banks that lead syndicates providing credits to

[11] Reese Harasawa, Chief Financial Manager, Corporate Planning Division, Mitsubishi Bank, presentation to Salomon Brothers Annual Global Banking Conference, April 1993.

[12] Hiroshi Ichizawa, director and general manager for Asia and Oceana at Sakura Bank, quoted by Peter McGill, "Bankers and Brokers Back Asian Boom," *Euromoney,* December 1992, p. 98.

Figure 2

Flow of Lending in Asia

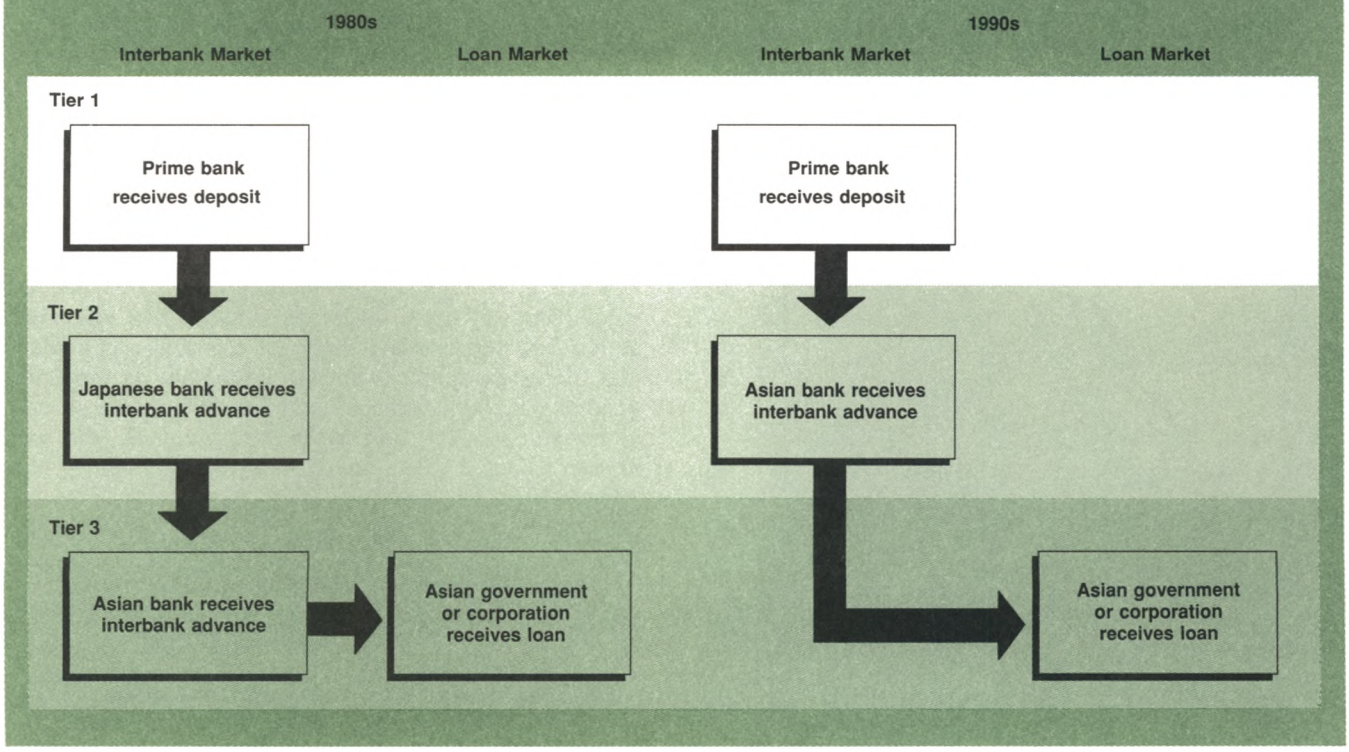

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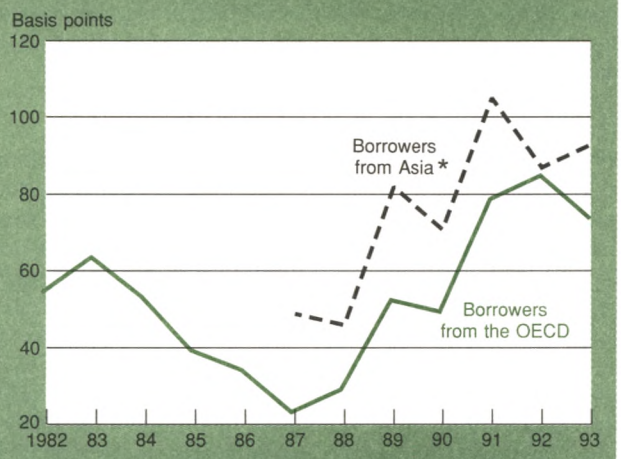
Chart 5

Spread on International Term Loans



Sources: Organization for Economic Cooperation and Development, *Financial Market Trends*; *International Financing Review*.

Notes: Chart shows loans of greater than three years and $30 million, weighted by dollar value. Data are through September 1993.

* Comprises Hong Kong, Indonesia, Korea, Malaysia, Singapore, Taiwan, and Thailand.

Asia's largest corporations and governments. In 1991 they were superseded by European banks in this role, and even by local banks (Chart 7).

Partial evidence suggests that Japanese banks hold a lower fraction of loans to Asian borrowers in the 1990s than they did in the 1980s. Data on Japanese banks' claims on individual countries are not published, but consider claims on Indonesia, Korea, Malaysia, Taiwan, and Thailand reported by banks in the United States, France, Germany, Britain, and the Netherlands (Chart 8).[13] Presumably, most of the balance is held by Japanese banks (although Swiss and Italian banks are other major players). Through the noise introduced by exchange rate changes, a signal emerges: U.S. and European banks appear to have stopped losing market share to all other banks, including Japanese banks.

Moreover, Japanese banks may have been ceding market share at a rate faster than is suggested by the upturn in U.S. and European banks' share. Banks from Asian surplus countries—Hong Kong, Singapore, and Taiwan—are stepping into the gap left by Japanese banks. Prominent among the syndicate leaders for credits to Asian borrowers (Chart 7) are Hong Kong Shanghai Bank and banks from Singa-

[13] We exclude Hong Kong and Singapore because of the extensive offshore banking operations there.

Table 2

Terms of Syndicated Loans to Flagship East Asian Borrowers

	1987			1988			1989			1990			1991			1992		
Borrower	Size (Millions of Dollars)	Maturity (Years)	Spread (Basis Points)	Size (Millions of Dollars)	Maturity (Years)	Spread (Basis Points)	Size (Millions of Dollars)	Maturity (Years)	Spread (Basis Points)	Size (Millions of Dollars)	Maturity (Years)	Spread (Basis Points)	Size (Millions of Dollars)	Maturity (Years)	Spread (Basis Points)	Size (Millions of Dollars)	Maturity (Years)	Spread (Basis Points)
Korea																		
Korea Exchange Bank	500	1 2-7	25.0 37.5										300	5	40.0			
Korea Development Bank	500	1-2.5 2.5-4	12.5 25.0							100	5	12.5	200	5	35.0			
Korea Electric Power	40	1-5 6-10	25.0 37.5													150	8	66.8
Indonesia																		
Republic of Indonesia	350	1-6 7-8	62.5 75.0				500	1-4 5-8	25.0 62.5	400	8	50.0	400	1.3 4-7	75.0 87.5			
Pertamina				126	1-3 4-8 9-12	100.0 87.5 100.0							800	13.5	137.5			
Thailand																		
Thai Oil Company				100	1 2-10	37.5 50.0				150	1-5 6-10	25.0 37.5	80	10	62.5	165	1-4 5-9	62.5 75.0
Thai Airways	35	1-4 6-9	12.5 25.0										94	12	70.0	70 85	12 12	75.0 65.0

Source: Organization for Economic Cooperation and Development, *International Financing Review*.

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pore, Taiwan, and even Malaysia.

Across the Pacific in the United States, Japanese banks have gradually retrenched their operations. Adopting the same strategy they had pursued in other markets, Japanese banks in 1990 slowed the growth of their interbank and other claims in this country to a rate below that of other banks (Charts 9 and 3). In the commercial and industrial credit market, however, Japanese banks' loans kept growing well after U.S. banks had started to retrench. More recently, Japanese banks have been losing market share as the market has revived but Japanese bank loans have not.

In sum, the decline in domestic asset prices has led to a reduction in overseas lending—first interbank and then customer—in the 1990s by Japanese banks. This retrenchment has to some extent spared business in Asia, where bankers expect better risk-adjusted returns than those available in Europe and America. Nevertheless, spreads appear to have widened for Asia's flagship borrowers. Japanese banks' response to their own loss of capital has created opportunities for banks from Europe and surplus countries in Asia.

Table 3

Measures of Sovereign Risk for Three Asian Countries

	Credit Ratings (Assessments at Year-End)			
	1989	1990	1991	1992
Standard & Poor's				
Indonesia	NR	NR	NR	BBB–
Korea	A+i	A+i	A+i	A+i
Thailand	A– i	A–	A–	A–
Moody's				
Indonesia	NR	NR	NR	NR
Korea	A2	A1	A1	A1
Thailand	A2	A2	A2	A2
Institutional Investor†				
Indonesia	45.3	48.0	50.4	50.5
Korea	67.6	68.7	68.1	67.6
Thailand	59.8	62.3	62.5	61.3
	Debt Indicators (Percent)			
Net external debt / gross domestic product				
Indonesia	45	51	48	53
Korea	6	4	5	4
Thailand	16	13	8	6
Net external debt/exports				
Indonesia	165	181	171	185
Korea	16	12	16	12
Thailand	42	33	19	15
Debt service/exports				
Indonesia	35	31	28	32
Korea	12	11	12	9
Thailand	16	17	15	14

Sources: Asian Development Bank, *Asian Development Outlook,* 1992; International Monetary Fund, *International Financial Statistics.*
Note: NR=no rating.
† Assessments published annually in September. Lowest risk = 100.

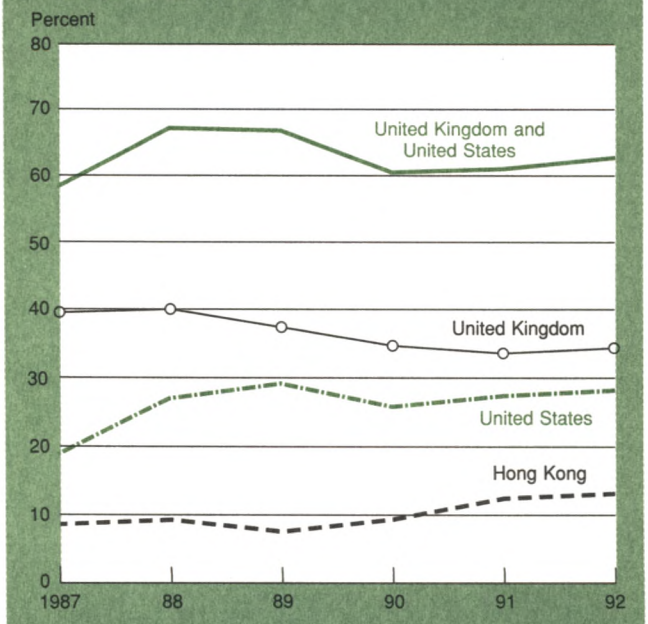
The Nikkei and Pacific capital markets

Life insurance companies, Japan's largest institutional investors, dominate Japanese investment in foreign securities. In 1988, life insurers held over a third of all foreign securities in portfolios permitted to take long foreign currency positions.[14] Foreign securities became an increasingly important portion of Japanese life insurers' portfolios over the 1980s, especially after regulations controlling the share of foreign securities in total flows and stocks were lifted or ceased to bind in 1986 (Chart 10). By end-1989, the share of foreign securities in insurers' portfolios reached about 15 percent of total assets or more than $150 billion. Since 1989, however, the share of foreign securities

[14] Juann Hung, Charles Pigott, and Anthony Rodriguez, "Financial Implications of the U.S. External Deficit," Federal Reserve Bank of New York *Quarterly Review,* vol. 13-14 (Winter-Spring 1989), p. 39.

Chart 6

Asset Shares of Japanese Banks' Overseas Branches



Sources: Bank of England; Bank of Japan; Commissioner of Banking, Hong Kong; Federal Financial Institutions Examination Council, Reports of Condition and Income.

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in life insurers' portfolios has declined, falling to less than 10 percent of the total in 1993. In the wake of deregulation, two major factors have influenced Japanese life insurance companies' demand for foreign securities: yield differentials between Japanese and foreign securities and changes in insurers' own wealth resulting from the boom and bust in Japanese asset prices.

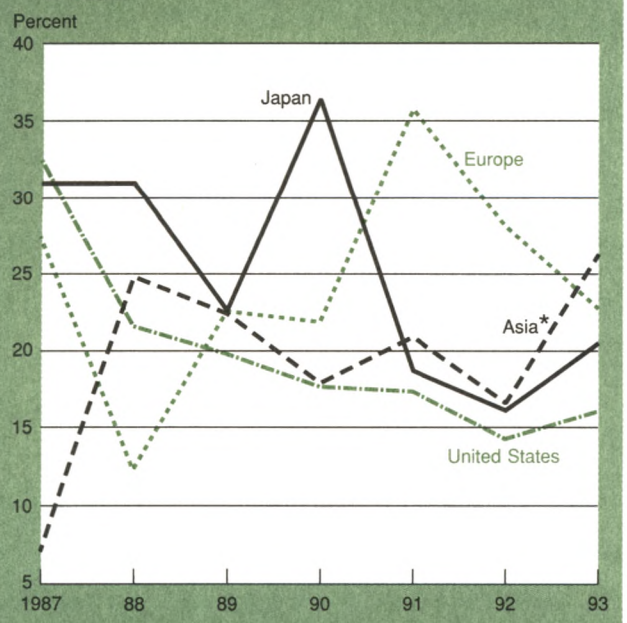
The declining importance of foreign securities in life insurance companies' portfolios after 1989 corresponds in part to a narrowing of the differential between Japanese and foreign interest rates. To be sure, the effect of interest rate differentials on the purchase of foreign securities became increasingly complex in the 1980s as insurers learned to put on and take off short-term hedges against the foreign exchange risk of their foreign bond holdings. Still, when the Bank of Japan in late 1989 tightened monetary policy in order to bring down asset prices in Japan, the gap between Japanese and foreign bond yields narrowed (Chart 11) and the purchase of foreign securities became less attractive. The differential between Japanese and U.S. rates narrowed from about 3¼ percentage points in 1986-89 to just over 1½ in 1990-93. Although wider, the differential between Japanese yields and a weighted average of various foreign bond yields—where the weights reflect Japanese life insurers' foreign portfolio in 1991—also narrowed by about 1½ percentage points. An analysis of the determinants of capital outflows from Japan has shown that a smaller yield pickup, unless fully offset by expectations of less yen appreciation or perceptions of lower risk, should reduce the purchase of foreign assets by Japanese institutional investors.[15]

The wealth of Japanese life insurance companies also took a turn after 1989. The rise in Japanese equity prices in the 1980s made insurers, with more than their net worth invested in equities, increasingly wealthy. The market value of their assets expanded rapidly relative to the present value of their commitments to policyholders. The subsequent decline of equity prices since 1989 has reversed this process.

[15] Kazuo Ueda, "Japanese Capital Outflows," *Journal of Banking and Finance*, vol. 14 (November 1990), pp. 1077-1101.

Chart 7

Arrangers of Asian Loans by Country or Region of Bank

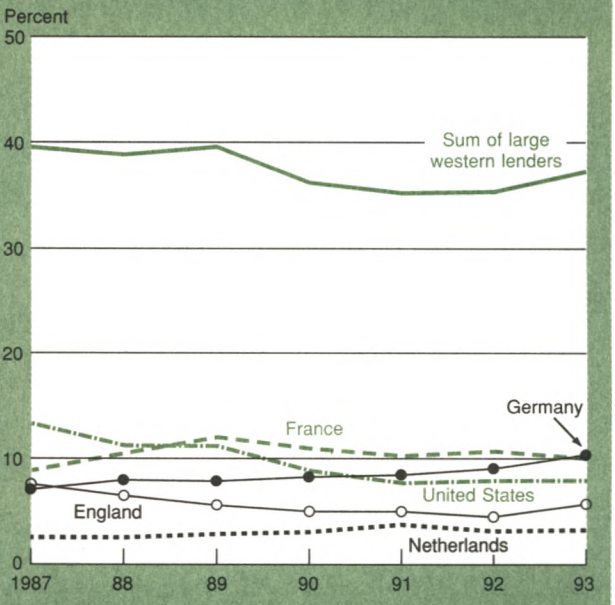


Source: *International Financing Review.*

*Asia comprises Indonesia, Hong Kong, Korea, Malaysia, Taiwan, and Thailand.

Chart 8

Share of North Atlantic Banks in BIS Claims on Asia



Sources: Bank of England; Banque de France; Bundesbank; De Netherlandsche Bank; Bank for International Settlements; Federal Financial Institutions Examination Council, Reports of Condition and Income.

Notes: Asia comprises Indonesia, Korea, Malaysia, Taiwan, and Thailand. The 1993 observation is for September for England, Germany, and the United States, but June for France and the Netherlands.

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Under normal circumstances, financial intermediaries' portfolio behavior depends on their wealth.[16] When wealth declines, managers become less tolerant of risk if they seek to avoid distress and have only limited access to new equity. Thus, an intermediary would be motivated to substitute low-risk assets such as government paper for high-risk assets such as corporate loans. Japanese life insurers, faced with the loss of stock market wealth, would choose to hold fewer risky foreign assets.

This logic would explain why Japanese insurers invested more of their portfolio in foreign securities as their wealth rose and less as their wealth fell. But it cannot explain why insurers chose to concentrate their portfolio in high-coupon foreign bonds (Table 4). Among the companies' foreign bond holdings, U.S., Canadian, and Australian bonds—all with relatively high coupons in the 1980s—are overrepresented. Of the European assets, relatively high-coupon French and ECU bonds claim a disproportionately larger share than the bonds of interest-rate-anchor Germany (particularly in 1991).

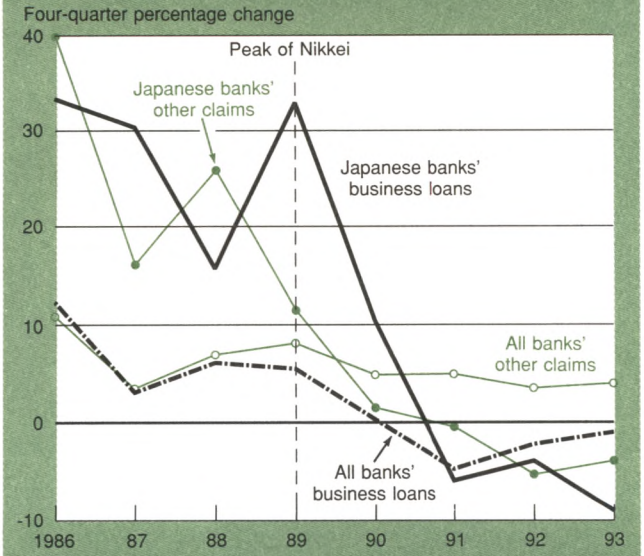
The appetite of Japanese life insurance companies for high-coupon foreign bonds resulted from the interaction of the property rights and management incentives of mutual life insurance companies with Ministry of Finance regulation. The mutual ownership of most Japanese life insurance companies gave managers discretion over the increasing wealth of their firms in the late 1980s. The managers, particularly those on the sales rather than the investment side of the organization, favored growth. To attract the new policyholders who would help the companies grow, managers were inclined to draw on this wealth to offer higher returns. Each year the returns promised by the insurers to buyers of annuities and whole life policies are negotiated by the firms' managers and the regulators in the Ministry of Finance.[17] The Ministry of Finance has sought to maintain the stability and net worth of insurers by restricting payments to policy-

[16] Bruce Greenwald and Joseph Stiglitz, "Monetary Policy and the Theory of the Risk-Averse Bank," Federal Reserve Bank of San Francisco, Working Paper in Applied Economic Theory, May 1993.

[17] Individual annuities have been the fastest growing business line for life insurers, though whole life policies remain the largest insured amount. The Life Insurance Association of Japan, *Life Insurance Business In Japan*, 1992-93, p. 3.

Chart 9

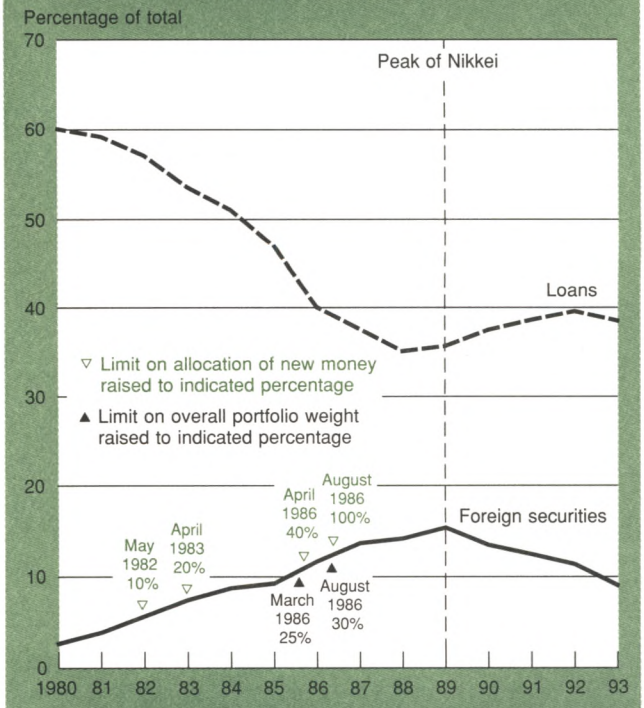
Growth of Bank Claims in the United States



Source: Federal Financial Institutions Examination Council, Reports of Condition and Income.

Chart 10

Asset Shares of Japanese Life Insurers and Constraints on Foreign Asset Shares



Sources: Bank of Japan; Richard C. Koo, "Japan and International Capital Flows," Nomura Research Institute, April 1992.

Note: Chart shows the progressive easing of constraints on the allocation of insurers' portfolio to foreign assets. From 1971, regulation limited overall portfolio weight on foreign assets to 10 percent.

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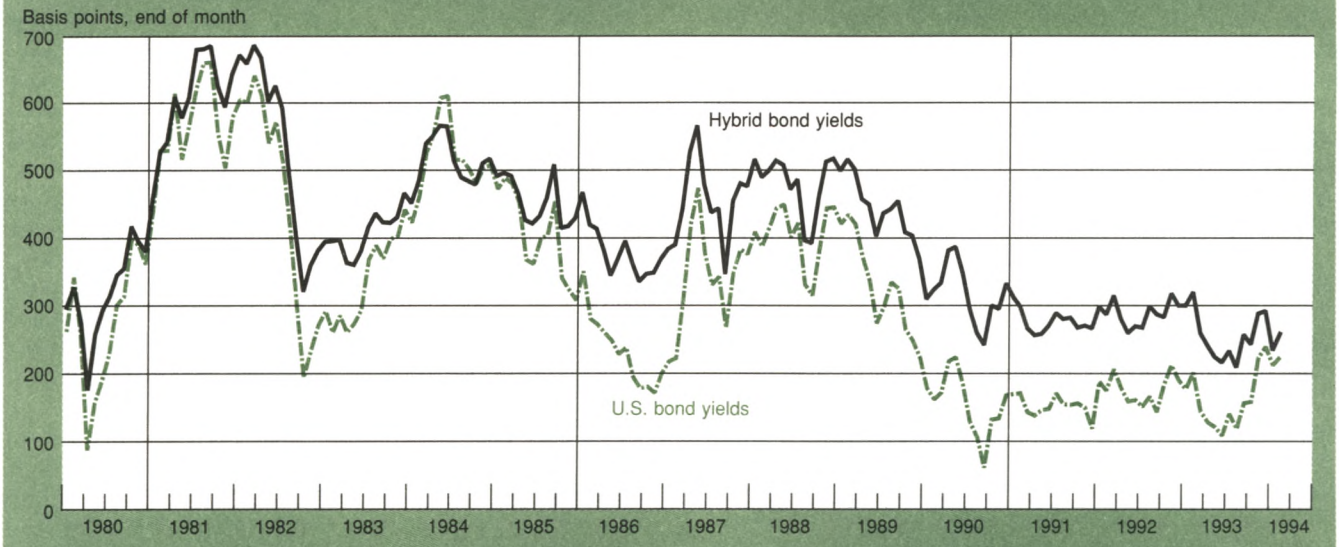
Chart 11

Yield Pickup for Japanese Investors in Foreign Bonds



Sources: Central banks of Australia, Canada, Denmark, France, Germany, Spain, the United Kingdom, and the United States.

Note: Hybrid yield represents an average of ten-year bond yields with weights taken from Japanese life insurers' portfolio as of September 1991. Thus, U.S. bond yields are weighted 0.39; Canadian, 0.25; Australian, 0.13; French, 0.1; German, 0.04; British, 0.07; Spanish, 0.01; and Danish, 0.004.

Table 4

The Distribution of the Foreign Assets of Japanese Life Insurance Companies

Percent

	Bonds			Equities			Bank Deposits		
Currency	1991	1992	1993	1991	1992	1993	1991	1992	1993
United States	32	35	38	68	64	65	71	83	94
Canada	21	24	17	2	4	4	6	5	2
Australia	10	10	7	4	5	6	7	3	1
Subtotal	63	69	61	73	73	74	83	91	97
Asia	0	0	0	2	1	2	0	0	0
Europe	27	23	30	25	25	23	16	8	2
United Kingdom	5	3	4	8	8	8	10	7	1
Germany	3	6	11	4	5	5	1	1	1
France	9	7	12	5	5	4	0	0	1
European Currency Unit (ECU)	6	4	2	4	4	4	4	0	0
Spain	1	1	0	1	1	0	1	0	0
Other	3	2	1	3	2	2	0	0	0
Other	11	9	8	0	1	1	0	0	0
Total (Trillions of Yen)	11.5	10.6	7.9	5.7	6.2	6.3	5.3	5.2	6.9

Source: Richard C. Koo, "Japan and International Capital Flows," Nomura Research Institute, April 1992, 1993, and 1994.
Note: Data are for September and may not add to 100 owing to rounding.

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holders to recurring income, that is, by prohibiting capital gains from being paid out directly.[18] Capital gains could only be realized to offset capital losses.

The ability of life insurers to invest in foreign securities provided the opportunity to convert capital gains into recurring income. A higher interest rate on a security denominated in one currency relative to a similar security denominated in another currency is generally offset by a loss on the first currency when exchanged into the second at maturity.[19] Thus, high-coupon foreign bonds, such as Australian treasuries, could permit attractive annuities to be marketed. In addition, if the Australian dollar were to fall against the yen, the capital loss could be offset by realizing a gain on domestic equity. Prudential rules intended to bottle up equity and to discourage speculation led life insurers to become "coupon hogs."[20]

The interaction of wealth and regulation not only explains the composition of insurers' assets but also the acceleration of asset growth in the 1980s and the deceleration in the 1990s. When unrealized capital gains on Japanese equities abounded in the 1980s, insurers and the Ministry of Finance could negotiate aggressive yields for policyholders that attracted a rapid inflow of funds. Since 1990, lower wealth and unrealized capital gains have led to less aggressive yield-setting on insurance products, a shift that has slowed the flow of funds from Japanese households to private insurers (Chart 12).[21]

The two channels through which reduced wealth has influenced Japanese insurers' foreign investment can be laid out schematically (Figure 3). A smaller cushion of unrealized capital gains has led to less tolerance for risk and thus a lower portfolio weight on foreign securities. A smaller cushion of capital gains has also led to more modest promised yields, slower growth of liabilities, and thus slower growth of assets, including foreign assets. These two effects have reinforced each other to produce lower investment in foreign securities in the 1990s.

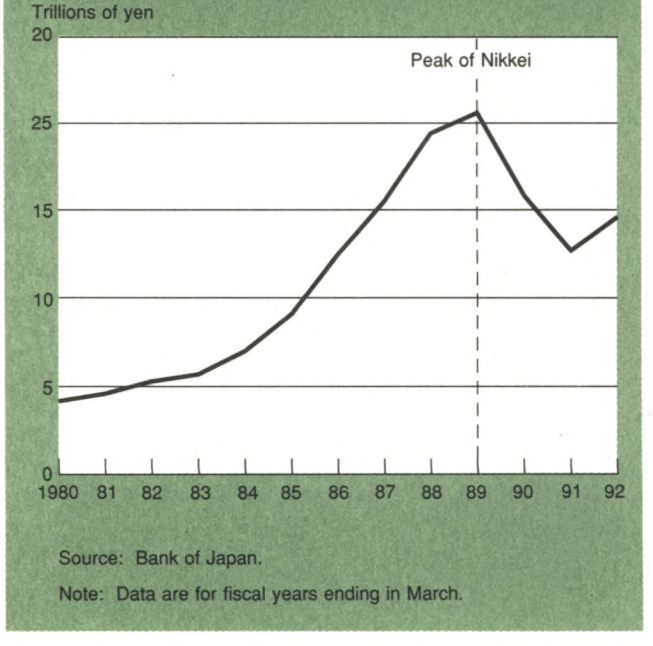
In summary, the role of wealth in Japanese life insurers' propensity to invest abroad differed across three periods in the fourteen years from 1980 to 1993. Through 1985, regulation governing either the share of new investments allotted to foreign securities or the share of foreign securities in the total portfolio constrained the insurers (Chart 10). From 1986 the regulation did not bind. Rather, exchange losses—realized, unrealized, and feared—warred with the incentives to reach for yield to determine the portfolio weight on foreign securities. With overall wealth rising through 1989, the portfolio invested in foreign securities reached about 15 percent in 1989. Thereafter, lower wealth and narrowed interest rate differentials reduced the fraction risked in foreign securities.

The impact of the collapse of Japanese asset prices on foreign investment in securities can be verified in individual markets. Overseas investment by Japanese life insurers has been concentrated in a few markets. Two-thirds to three-quarters of all investment in foreign securities by life insurers has been in the Pacific bond markets with high nominal yields: the United States, Canada, and Australia (Table 4).

The retrenchment by life insurance companies and other Japanese institutions is particularly evident in these three

Chart 12

Annual Increase in Household Claims on Private Insurance Companies in Japan



Source: Bank of Japan.

Note: Data are for fiscal years ending in March.

[18] Richard C. Koo, "International Capital Flows and an Open Economy: The Japanese Experience," in Shinji Takagi, ed., *Japanese Capital Markets* (London: Blackwell, 1993), p. 84.

[19] Irving Fisher, *The Theory of Interest* (New York: Macmillan, 1930).

[20] The same incentive led Japanese life insurers to engage in dividend capture tactics. They would buy the shares of companies about to pay a dividend and then immediately sell the shares, realizing both income and a capital loss on the shares. See George Anders, "Japanese Players Grab Big Dividend Income in Latest Market Ploy," *Wall Street Journal,* May 20, 1988, p. C1; and William Power and Michael R. Sesit, "Mania for Dividend Capture Subsides," *Wall Street Journal,* May 12, 1989, p. C1.

[21] Although the liberalization of time deposits in 1989 reduced the share of the total flow of household funds to insurers in favor of banks, since 1989 Japanese banks have widened their margins between deposit and loan rates. If life insurers were competing only against Japanese banks for household savings, the insurers' relatively lower yields might not translate into slower balance sheet growth. The government postal savings system has offered competitive rates, however, leading to a growth of public intermediation at the expense of private.

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bond markets. The retreat occurred immediately after asset prices peaked in Japan (Chart 13). In all three markets, Japanese net purchases declined in 1990, and in the United States, the Japanese became net sellers of bonds in that year. In Australia, the Japanese sold securities in 1990, although the lack of disaggregated data obscures whether bond or equity markets bore the brunt of the sales. The recovery in 1993 in purchases of U.S. bonds, set against the substantial liquidations of Canadian and Australian bonds last year, suggests considerable switching among dollar bond markets.

Japanese sales of foreign bonds in the first quarter of 1994 (Chart 1) also help put into perspective the 1993 purchases of U.S. bonds, which were concentrated in the fourth quarter. Japanese mutual funds (securities investment trusts), banks, and other investors with short horizons bought dollar bonds in the fourth quarter only to experience losses and presumably to liquidate their positions in the first quarter.[22] Moreover, this sharp swing only exaggerates a quarterly pattern observed since 1990 that can be interpreted as showing the diminished role of long-term investors such as life insurers.[23]

Measures of overall Japanese activity in the U.S. bond market show a general retreat since 1989. Gross Japanese transactions in U.S. bonds have declined from 1989 through 1992 and are currently running below 1989 levels. (The emergence of substantial investment affiliates in the United States, however, suggests that some of the activity has just been domesticated.) Meanwhile, all foreign transactions have risen significantly since the Japanese-led decline in 1990. The biggest declines in Japanese activity in 1990 and in 1992 coincide with sharp Nikkei falls.

The data from the Canadian bond market show a similar pattern. Japanese transactions stopped growing in 1989 and began to decline in the first half of 1992. (Much of Japanese involvement may be obscured by participation through other countries.)

Japanese activity in U.S. equities does not show a break in 1989. Japanese transactions peaked in 1988 as the Japanese sold equity after the October 1987 break. Nevertheless, while other foreigners have regained their appetite for U.S. equities in the last year and a half, the Japanese

[22] Richard C. Koo, "Japan and International Capital Flows," Nomura Research Institute, April 1994, p. 20. To the extent that these investors hedged their currency exposure (and banks do so as a matter of course when buying foreign bonds for their own account), their investment and behavior was like that of many U.S. investors who had bought bonds with borrowed money.

[23] "Saikin ni Okeru Naigai Shikin Furo no Doko [Recent International Capital Flows]," *Nihon Ginko Geppo* [Bank of Japan *Monthly*], May 1994, pp. 43-45.

Figure 3

Effect of Drop in Nikkei on Foreign Securities Markets

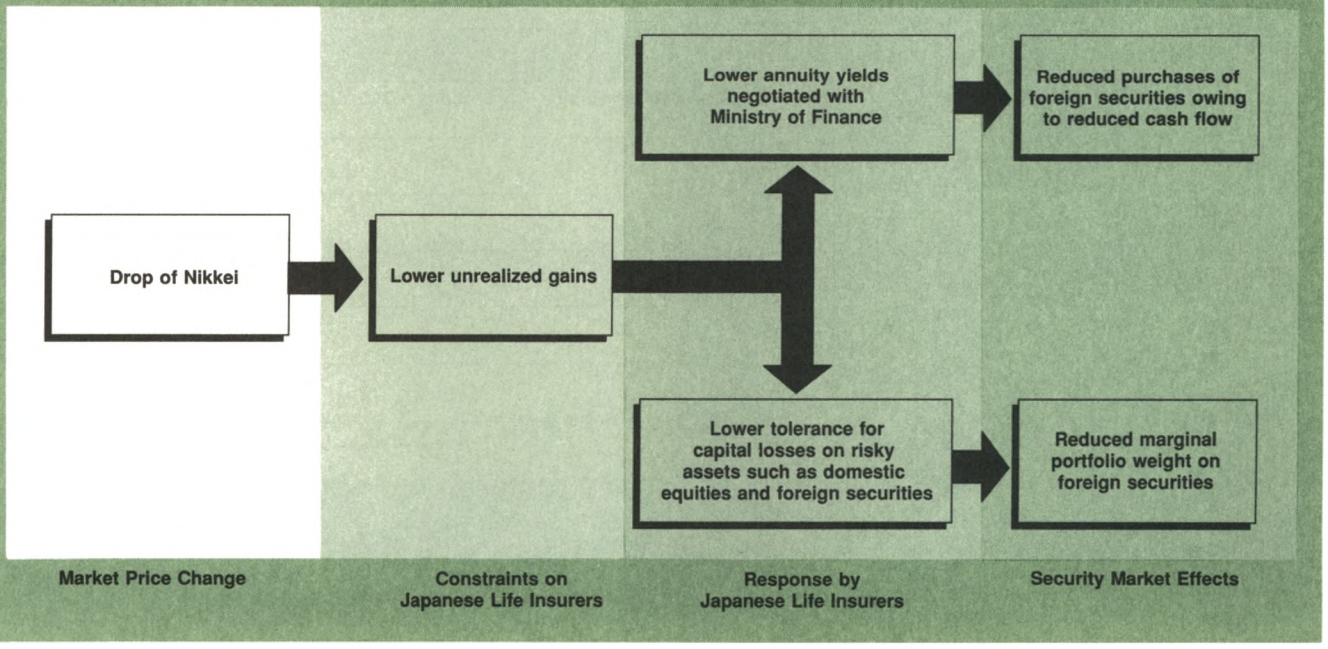

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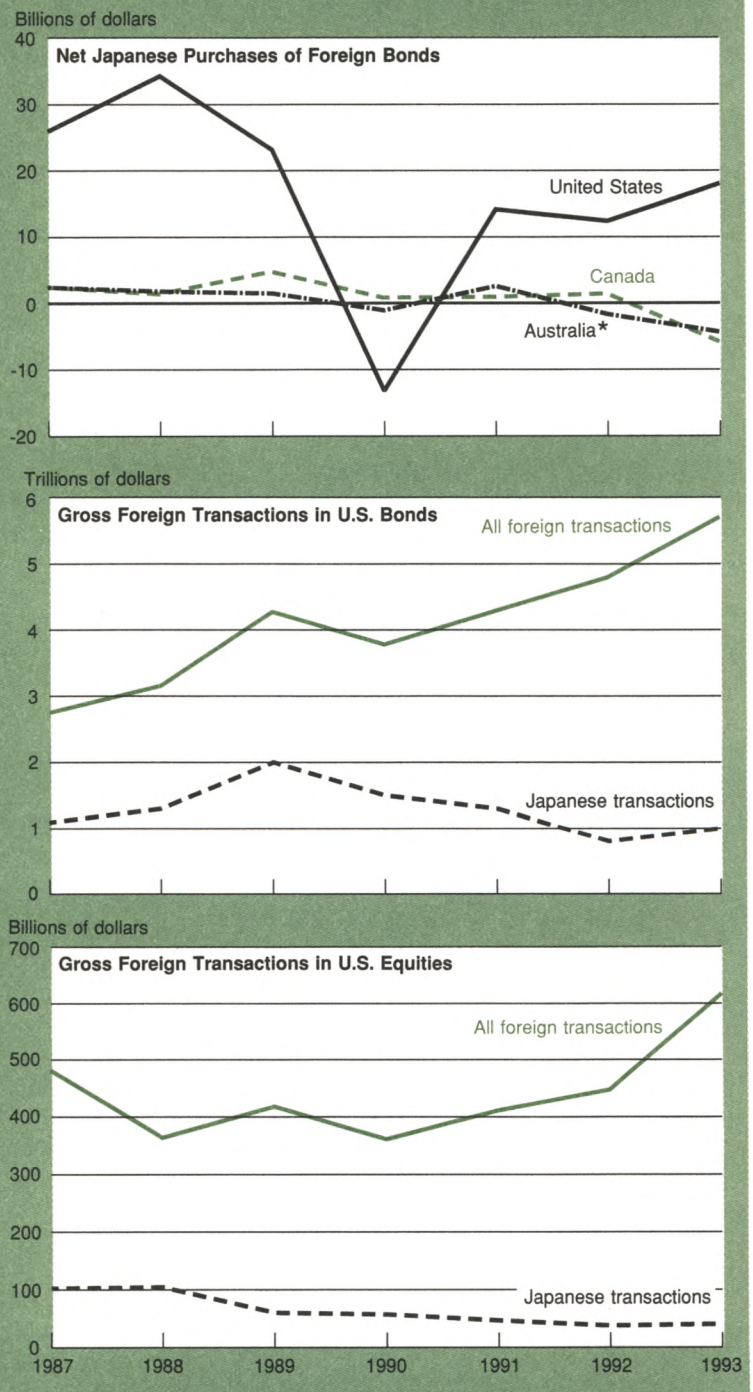
Chart 13

Declining Japanese Participation in Foreign Securities Markets

Private Japanese investors reduced their net purchases of U.S., Canadian, and Australian bonds from an average annual rate of 33 billion dollars in 1987-89 to 6 billion dollars in 1990-93.

Japanese transactions in U.S. bonds made up almost half of all foreign transactions in 1989 but have since fallen to less than one-fifth.

Unlike other foreign investors, Japanese investors never resumed their trading in U.S. equities after the 1987 crash.



Sources: Japanese Ministry of Finance; U.S. Treasury; Statistics Canada.

*Australian figures are for bonds and equity.

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have continually reduced their activity.

Conclusions and implications

When the world's leading creditor country experiences a recession and cuts its long-term capital outflows, risks to the global economy may arise.[24] In the present case, the danger would be that even as world exports to Japan level off, borrowers dependent on credit from Japan might experience a sudden loss of access to credit. In fact, however, the strategies of Japanese banks, the portfolio behavior of Japanese insurers, and fortuitous timing have all eased the adaptation of Japan's debtors to this new state of affairs.

In the interbank markets, the rapid growth of placements has tailed off as Japanese banks have restructured their balance sheets to reflect their new wealth position under the Basle Accord constraints. Fast-growing Asian countries that have increasingly relied on interbank markets to finance their external deficits have had to adjust to reduced liquidity in this market. Banks from deficit countries now have the opportunity to raise their profile in the interbank market, and banks from surplus countries in the region can perform some of the intermediation services heretofore offered by Japanese banks.

In the market for bank credit to Asian sovereigns and companies, Japanese banks have sought to clear higher capital cost hurdles by widening spreads. The terms paid by flagship borrowers from Indonesia, South Korea, and Thailand appear to have stiffened accordingly.

Japanese banks' difficulties might have proved more troublesome for classes of borrowers that enjoyed no ready substitute source of credit. But the most likely candidates, marginal Asian corporations and banks, have actually benefited from the Japanese banks' revised international strategies. Moreover, the decline of U.S. dollar interest rates has meant that the widening of intermediation margins has only partially offset favorable developments in the cost of debt capital. In the U.S. commercial loan market, asynchronous business cycles across the Pacific have proved stabilizing. On this evidence, it is hard to argue that Japanese banks aggravated any U.S. credit crunch in 1990 (Chart 11). In the years ahead, some Japanese banks are planning to increase their lending in the United States, in part because the rise of the yen has lowered the value of their foreign assets in relation to capital.

In capital markets, the loss of wealth by Japanese institutional investors curbed their appetite for exchange risk and slowed their activity in bond markets in New York, Toronto, and Sydney. Japanese institutional investors' habit of shunning credit risk even as they took foreign exchange risk, however, limited the effect of their reduced investment abroad (Table 4). Even within the fairly safe industrial country markets, Japanese investors preferred high-quality securities. Thus, according to the U.S. Treasury's 1992 benchmark survey, Japanese investors held three-quarters of their portfolio of long-term U.S. securities in safe Treasuries and agencies. As a result, the drop-off in Japanese flows to the bond market tended to work itself out in general interest rate levels rather than depriving particular borrowers of their access to credit. At most, the retreat of Japanese investors from the U.S., Canadian, and Australian bond markets contributed to the lags between the decline of short-term rates and the decline of long-term rates in these capital markets in the early 1990s, and this lag slowed the recovery of housing and other interest-sensitive sectors.

The rise in long-term outflows from the United States has also cushioned the impact of the Nikkei's decline on Asian countries. The flood of money out of U.S. institutional portfolios into equity markets around the Pacific has tended to lower the cost of equity there. It may seem odd that the United States, running a current account deficit of more than $100 billion, is investing in Pacific capital markets. A considerable share of the financing for such investments is coming out of the international interbank market, which in turn is experiencing a rapid influx of Japanese funds (Table 1). In effect, U.S. institutional investors are supplementing Japanese institutions' own recycling of the Japanese current account surplus.

[24] Charles P. Kindleberger, *The World in Depression* (Berkeley: University of California Press, 1973).

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In Brief: Understanding the Rising Japanese Trade Surplus

by Thomas Klitgaard

Intuition suggests that a strengthening of the yen should moderate Japan's trade surplus by reducing the price competitiveness of Japanese goods. Yet the Japanese merchandise trade surplus more than doubled from 1990 to 1993, reaching a record $120 billion, at the same time that the yen appreciated roughly 30 percent against the dollar. Is the pairing of these developments evidence of an unusual relationship between Japan's exchange rate and its trade surplus?

The answer, in short, is no. The nominal trade surplus, which is the difference between the value of exports and imports, is affected by changes in prices. A yen appreciation tends to lower the price of imports relative to exports, pushing the trade balance higher. The real trade surplus, by contrast, excludes these valuation effects, assessing trade developments instead as the difference between the volume of goods shipped in and out of Japan. By this measure, the trade surplus did respond to the yen appreciation as one might expect: it fell 20 percent from 1990 to 1993 as more goods were imported into Japan and fewer goods were exported (Chart 1).

This article explains why the two measures of the Japanese trade surplus initially move in different directions when the yen appreciates. It also examines how the surplus is likely to behave under different exchange rate scenarios. The article's key conclusion is that the nominal surplus should fall significantly once the yen stabilizes. A further rise in the yen, however, would push the nominal balance still higher over the short term—while putting more downward pressure on the surplus when calculated in volume terms.

Recent developments

When measured in the yen value of the goods being traded, the nominal surplus jumped 75 percent from 1990 to 1993 as imports fell much more than exports.[1] When calculated in dollars, the nominal surplus advanced even more—130 percent to $120 billion—because a given yen surplus is automatically converted into a higher dollar value whenever the yen appreciates.[2] Most of the $70 billion increase in the trade surplus during these three years stemmed from trade with the developing world. The trade balance with the United States rose by a relatively modest $12 billion, dropping from three-quarters of Japan's global surplus in 1990 to less than half in 1993.[3]

Although the slowdown in domestic activity in Japan affected the change in the trade surplus after 1990, the picture of a large trade surplus in 1993 would not be substantially altered if the Japanese economy had instead been operating at its potential level. The Japanese recession is estimated to have reduced imports by about $12 billion in 1993 from what they would have been if the economy were operating at its potential level.[4] This calculation indicates that the trade surplus would still have exceeded $100 bil-

[1] All data in this article are from the Japanese Tariff Association.

[2] When the yen's value changes, the behavior of imports and exports differs according to their currency denomination. For example, after the yen's rise from 1990 to 1993, imports remained roughly unchanged in dollar terms while they dropped sharply in yen terms.

[3] The bilateral balance with the United States, in yen terms, remained unchanged from 1990 to 1993.

[4] This estimate is based on a negative 4.0 percent gap between actual and potential GDP in 1993 and a 1.3 income elasticity for import demand. Further adjusting for weakness in some major industrial countries would narrow the difference between the actual and the cyclically adjusted trade surplus.

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lion in 1993, twice its 1990 level, even without the slowdown in the Japanese economy. A similar calculation for 1990 suggests that the trade surplus in that year was about $12 billion smaller because the Japanese economy was operating above its potential level.[5] Together, these estimates imply that changes in Japanese GDP relative to its potential level explain roughly a third of the $70 billion increase in the trade surplus from 1990 to 1993.

In contrast to the rise in the nominal trade surplus, the surplus in real terms dropped 20 percent from 1990 to 1993.[6] The rising yen helped push the real surplus down by making Japanese goods relatively more expensive on both domestic and world markets. As a consequence, the growth of exports moderated while the demand for imports rose despite the Japanese recession. An additional factor behind the slowdown in exports was weak economic activity in the major industrial countries.

A similar divergence between the real and nominal trade balances occurred after the yen's sharp rise in the mid-1980s. From 1985 to 1987, the yen appreciated 70 percent against the dollar. As in the more recent period, the nominal surplus rose in yen terms, increased much more in dollar terms, and declined in real terms.

The recent behavior of the real and nominal measures of the Japanese trade surplus raises two issues for policymakers:

- The steep increase in Japan's nominal trade surplus may be troubling to the foreign exchange markets. In the mid-1980s, large nominal imbalances in the world were seen as one of the principal forces upsetting currency markets. The increase in the Japanese surplus marks the reappearance of large imbalances among the major industrial countries. In particular, Japan's $120 billion trade surplus in 1993 was $40 billion higher than its peak surplus in the 1980s.
- The decline in Japan's real trade surplus has favorable implications for employment and production in coun-

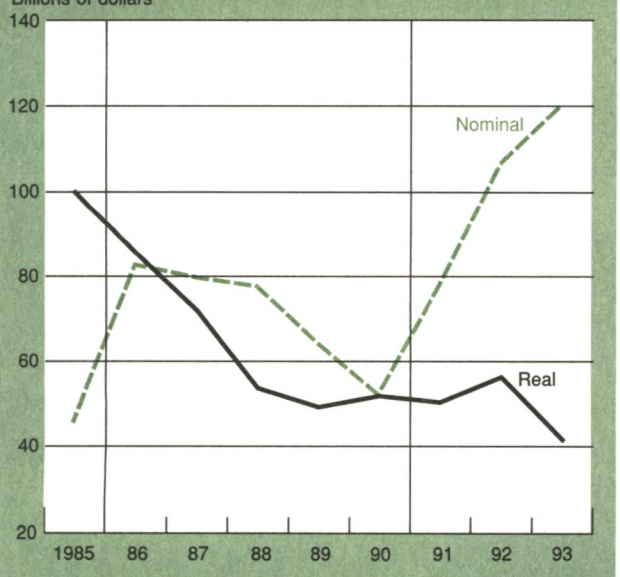
[5] The calculation assumes that the Japanese economy was operating roughly 4.0 percent above its potential level in 1990.

[6] The volume data, derived using unit value price indexes, reflect the number of items being shipped in and out of Japan. Some analysts question whether unit value indexes are the most appropriate price measure for calculating the real trade surplus because they do not take into account changes in the quality of traded goods.

The decline in the real surplus is closer to 50 percent if both 1990 and 1993 levels are adjusted for the deviation of Japan's output from its potential level.

Chart 1

Japanese Merchandise Trade Surplus

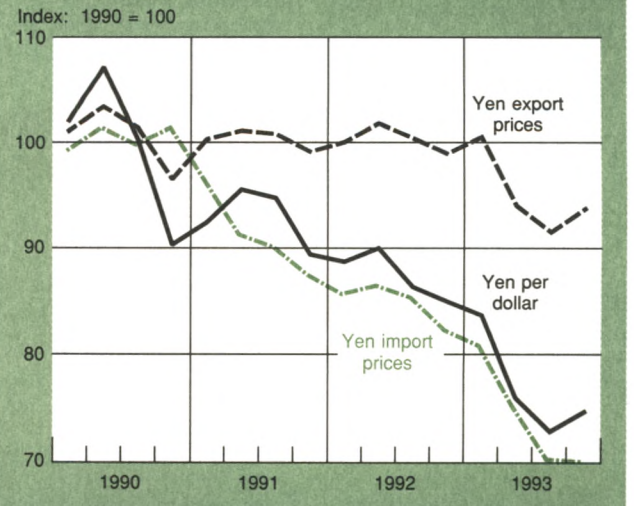


Source: Japanese Tariff Association, *Summary Report on Trade of Japan.*

Note: Real trade surplus is calculated using quantum indexes based on 1990 prices. Yen values are converted into dollars at the 1990 exchange rate.

Chart 2

Exchange Rate and Yen Prices



Source: Japanese Tariff Association, *Summary Report on Trade of Japan.*

Note: Prices are unit value indexes in yen terms.

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tries that trade with Japan. Output in these countries has been stimulated by the drop in the volume surplus to roughly half its 1985 record level.

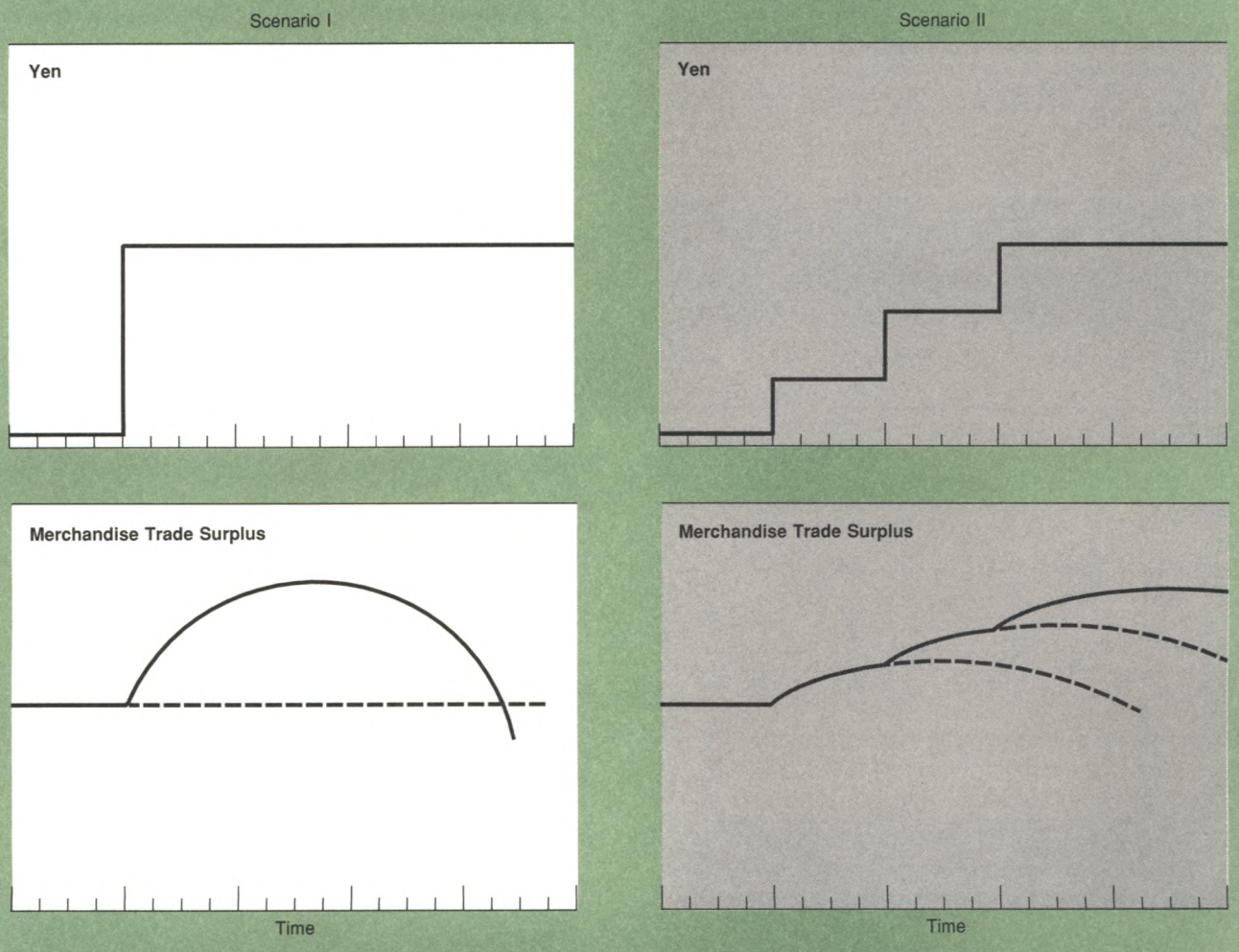
The yen and import prices

The tendency for a yen appreciation to lower import prices governs the behavior of the nominal trade balances over the short term. The yen price of imported goods falls immediately when the yen rises against the dollar because most Japanese imports are denominated in dollars and therefore cost less in yen terms.[7] An appreciating yen will therefore lower the cost of imports, leading to a drop in nominal imports. Export prices may also fall as Japanese producers seek to offset the yen's rise to preserve their foreign sales, but the decline is limited by the producers' ability to cut costs or their willingness to accept lower profits. The recent difference in price behavior—with import prices in yen

[7] Food, oil, raw materials, and manufactured materials make up 85 percent of Japanese imports. These goods are usually priced in dollar terms on world markets.

Chart 3

Change in Trade Surplus under Two Yen Appreciation Scenarios



Note: Scenario I involves a single appreciation in the first period; scenario II, a sequence of appreciations.

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terms down 30 percent from 1990 to 1993 and export prices down less than 10 percent (Chart 2)—caused nominal imports to fall relative to exports, pushing the nominal surplus higher.[8]

The initial increase in the nominal surplus generated by a currency appreciation is eventually unwound as lower prices spur the demand for imports. Over the same period, export sales moderate because the stronger yen puts Japanese goods at a price disadvantage on world markets. More specifically, the boost to the nominal surplus from the drop in import prices is more than offset by a decline in the real balance as the demand for imports and exports responds to the change in relative prices.[9]

The behavior of the nominal yen surplus, first rising and then eventually falling below its initial level, is known as the J-curve effect. This effect is illustrated in the lower panels of Chart 3. In Scenario I, a onetime yen appreciation raises the trade surplus (represented by the solid line) above the path it would have followed in the absence of an exchange rate change (dashed line). Over time, however, the balance falls below the level it would have maintained had the currency remained unchanged.

The Japanese trade surplus has yet to experience the full J-curve effect. It has not fallen back to its 1990 level because the rise in the yen was not a onetime jump. Instead, the yen appreciated 7 percent in 1991, 6 percent in 1992, and 14 percent in 1993, effectively creating a sequence of smaller J-curves (Scenario II). The trade surplus increased steadily after 1990 because the yen's ongoing appreciation kept the trade balance adjustment always on the initial upward segment of a succession of J-curves (represented by the solid line), preventing the surplus from reaching the downward segment (represented by dashed lines). If all of the yen's rise since 1990 had occurred in the first year, then the nominal yen balance would likely be significantly lower than it is today. The sequence of J-curves, however, has effectively delayed the date when the nominal balance reaches the downward segment of the J-curve.

Finally, note that the eventual decline in the nominal surplus in response to a yen appreciation will always be less than the decline in the real surplus. As explained above, a strengthening yen lowers import prices relative to export prices. The resulting change in relative prices offsets part of the decline in the real balance, causing the nominal surplus to be less affected by a rise in the yen than is the real surplus. Consequently, the yen has a relatively large impact on how Japanese trade affects the world's real economies and a relatively smaller impact on capital flow imbalances between countries.

Conclusion

The rise in the yen since 1990 pushed the nominal Japanese trade surplus upward while reducing the real trade surplus. If the yen stabilizes, then the nominal balance is poised to decline in response to the past yen appreciation. A further rise in the yen, however, would likely force the nominal surplus even higher, delaying once again the downward adjustment in the merchandise trade surplus that eventually comes from a stronger yen.

[8] An alternative measure of export prices is available in Japanese wholesale price data. Based on a survey of prices for exported goods adjusted for quality changes, this index indicates more aggressive price cutting by Japanese exporters, particularly in 1991 and 1992, than is suggested by the unit value data.

[9] The nominal yen balance will fall back below its initial level if the demand for imports and exports responds sufficiently to changes in relative prices. The Marshall-Lerner condition specifies the relative price elasticities needed for a rising currency to lower the trade balance over time. Most empirical studies find that Japanese trade satisfies this condition.

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In Brief: High Foreign Real Interest Rates and Investment in the 1990s

by C. L. Osler

Long-term interest rates among developed countries have been quite high during the 1990s. This article suggests that the high rates set back the economies of these countries by depressing output and investment.[1] Business investment was hit particularly hard, experiencing unusually large declines both before and during the recessions in these countries. Housing construction seems to have been disrupted as well, although government stimulus programs and other special factors largely offset that negative influence in some countries. Overall, high interest rates are estimated to have reduced output in the foreign members of the Group of Seven (G-7) by 2½ to 4½ percent per year on average over 1990-93.

Investment consequences of high real interest rates abroad: A qualitative analysis

Inflation-adjusted or "real" interest rates among the major industrial trading partners of the United States have generally exceeded 5 percent over the past ten to fifteen years (Chart 1). This figure is clearly above earlier rates, which averaged 2.3 percent before 1973 and 0.5 percent from 1973 to 1982 for the group as a whole.[2] The rates in this decade have also outstripped average rates during the recessions of the mid-1970s and early 1980s. In 1990, average real rates in the foreign members of the G-7 were over 6 percentage points higher than they had been in comparable earlier business cycles.[3] Though they declined somewhat during 1992 and 1993, at the end of this period real rates for this group remained a still-notable 2½ percentage points above rates in the business cycles that peaked in second-quarter 1974 and first-quarter 1980.[4]

In some members of the G-7, these high interest rates correlated very clearly with a drop-off in overall private investment (Chart 2). In Canada and the United Kingdom, private investment declined unusually rapidly during the early stages of these countries' recessions, and it remained depressed far longer than is typical. In Germany, France, and Japan, however, the effects of the high real interest rates were less evident; private investment did not perform any worse than in past downturns.

A closer look at private investment and its components reveals that the apparent resilience of overall investment in Germany, France, and Japan was due entirely to strength in residential construction in those countries (Chart 3 plots the behavior of real residential investment). By contrast, real business investment, which typically represents about two-thirds of private investment, fell exceptionally rapidly

[1] Countries considered here are members of the Group of Seven: France, Germany, the United Kingdom, Japan, and Canada. Although long-term real interest rates in Italy, another G-7 member, were also high during the 1990s, this country is not discussed extensively in the text for reasons of space and data availability. The data for "Germany" refer to the western region alone.

[2] The historical period used to construct the pre-1973 average begins in 1967.

[3] To calculate the foreign G-7 average, 1992 dollar GDP weights were used.

[4] Analysts differ about the causes of these high real interest rates. Among the causes cited are (i) high levels of indebtedness among individuals and businesses, (ii) increased equilibrium and/or expected returns to capital, and (iii) widening fiscal imbalances in the United States and some other countries. See Howe and Pigott, "Determinants of Long-Term Interest Rates: An Empirical Study of Several Industrial Countries," Federal Reserve Bank of New York *Quarterly Review*, vol 16, no. 4 (Winter 1991-92), pp. 12-28. See also Brunner and Kaminsky, "World Interest Rates: The Driving Forces," Board of Governors of the Federal Reserve System, mimeo, April 1993; and Barro and Sala-i-Martin, "World Real Interest Rates," *Macroeconomics Annual* (National Bureau of Economic Research, 1990), pp. 15-60.

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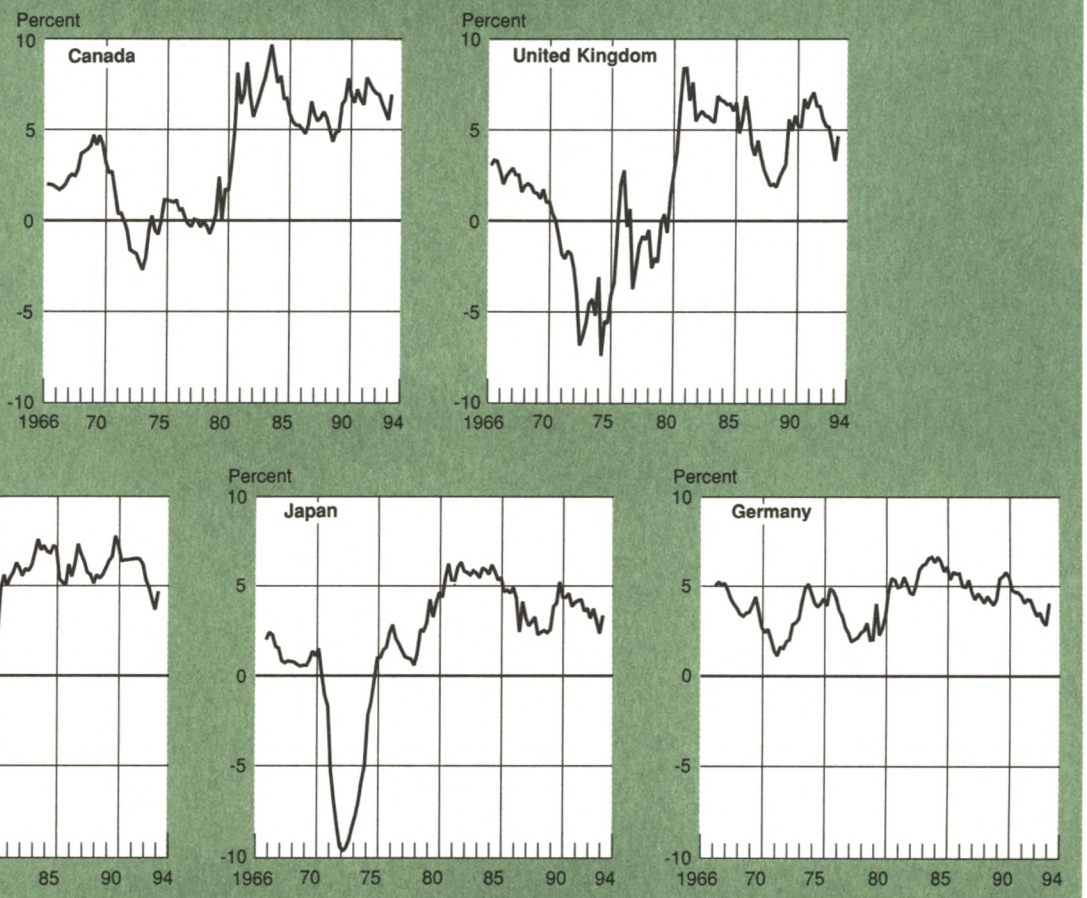
during the recent recession in all the countries under consideration (Chart 4). The impression that high rates were strongly depressing business investment is reinforced by two observations. First, this sector showed marked weakness in Japan despite modest fiscal stimulus measures.[5] Second, the growing use of computers causes the data on real business investment, which includes a measure of the amount of new computing power, to understate this sector's weakness. The fall in business investment would be all the more striking if measured in nominal terms, in part because the cost of purchasing a given amount of computing power has declined so dramatically. Note too that business investment was quite weak in most countries even before overall output began to decline, implying that this sector may have contributed to the onset of the recessions.

The strength of residential construction in Germany, France, and Japan is largely attributable to unusual factors specific to those countries. In Germany, an immigration wave that began late in the 1980s spurred the demand for new housing. The population of western Germany, constant

[5] Japanese tax incentives and other measures to promote capital investment are expected to cost less than 1/3 of 1 percent of GDP, however, so it is not surprising that they did not fully offset the negative effects of high real interest rates.

Chart 1

Real Government Bond Yields



Sources: Central Bank reports; Statistics Canada, *Canadian Economic Observer;* Central Statistical Office of the United Kingdom, *Monthly Digest of Statistics, Supplement; Consensus Forecasts,* April 1994.

Notes: Real interest rates are calculated by subtracting from long-term bond yields (for bonds with maturities of roughly ten years) the average of actual inflation over the current and following two years. To calculate real rates for 1992-I to 1994-I, forecast values of inflation through 1996-I were used when actual values were not yet available.

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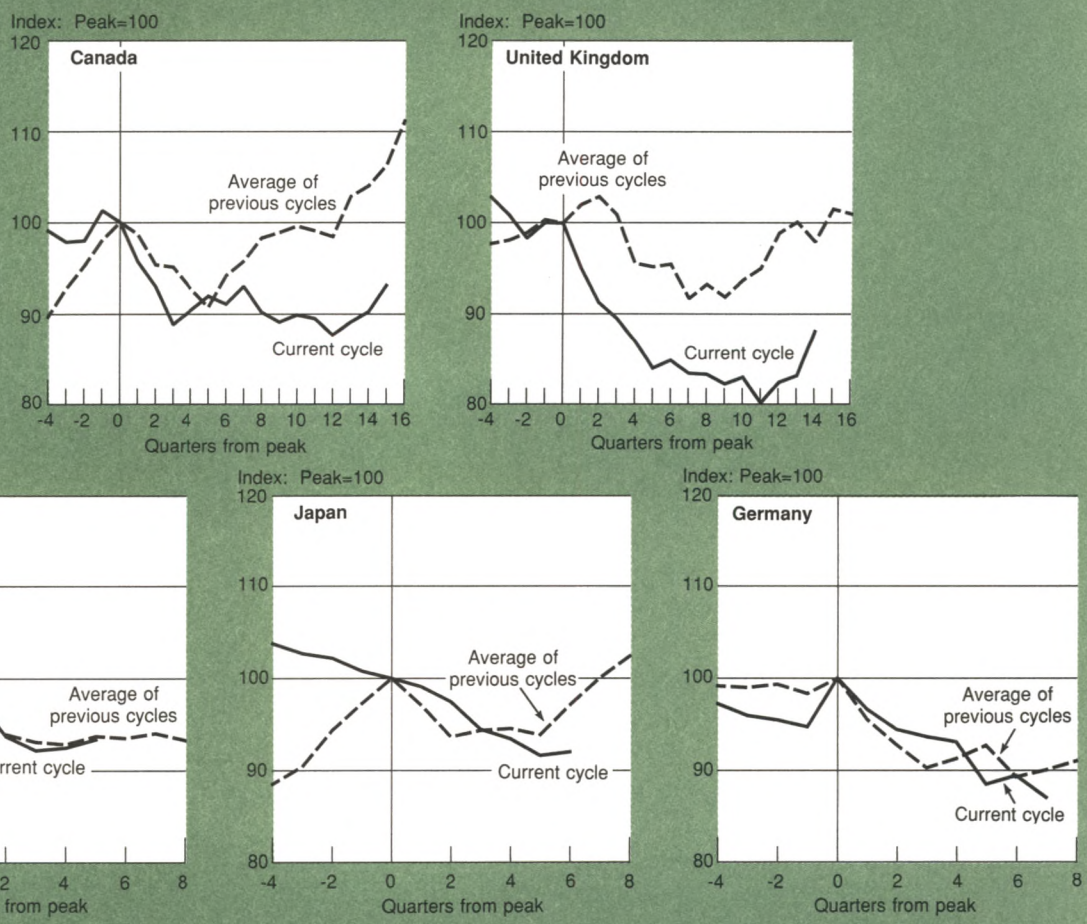
for two decades, swelled by roughly 6 percent during 1988-92. The immigrants are primarily ethnic Germans from Eastern European states once under Communist control.

The support for housing construction in Japan and France comes principally from special government programs targeted directly at this sector. The Japanese government has sought to stimulate housing construction through a vast increase in the supply of subsidized housing loans; since 1992 it has allocated roughly 1½ percent of a year's GDP for this purpose. The government has charged only 3.6 percent on its mortgage loans, substantially less than the prevailing market rate of about 5.8 percent. In addition, some taxes and regulations have been altered to promote further housing construction: for example, the government reduced the gift tax for those who receive funds for the purpose of purchasing residential property, and it eased regulations regarding floor areas and basements. Last year, these financial and tax incentives helped stimulate double-digit growth in private housing starts, which was the main source of strength in housing construction overall.

In contrast to the Japanese, the French are relying particularly heavily on tax incentives to stimulate housing construction and are using direct subsidies very little. Employees whose housing-related expenditures exceed FF 20,000 ($3,000) can now withdraw funds without penalty from special profit-share savings funds that are normally frozen for five years. In a similar vein, individuals who withdraw money market funds to buy a home are exempted from the capital gains tax on such withdrawals. The French authorities have also tried to stimulate residential construction

Chart 2

Private Investment: A Cyclical Comparison



Sources: Central Bank reports; Statistics Canada, *Canadian Economic Observer;* Central Statistical Office of the United Kingdom, *Monthly Digest of Statistics;* INSEE, *Information Rapides.*

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more directly by accelerating the government's own investment in housing. These efforts will likely involve a smaller commitment of government funds, relative to GDP, than the Japanese efforts.[6]

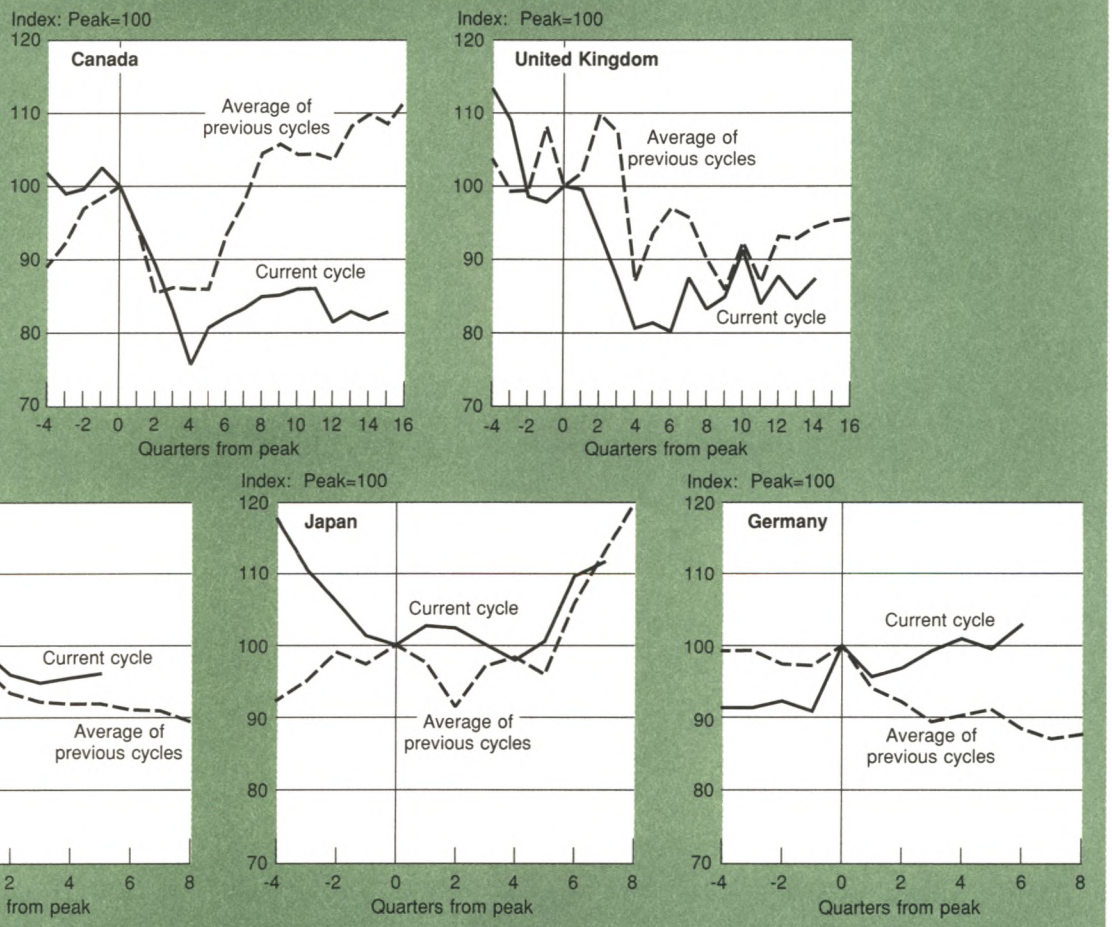
The fiscal stimulus programs in Japan and France were implemented after the countries' recessions began. Before then, housing construction in these countries was actually declining, and was much weaker than it had been before earlier recessions. This observation suggests that the high real interest rates had indeed depressed this sector in the beginning of recession in France and Japan, in much the same way as in Canada and the United Kingdom. In the latter two countries, however, no special policies were implemented to support residential construction, so it is not surprising that the sector remained unusually depressed throughout the early 1990s.

The extended weakness of residential and business investment in Canada and the United Kingdom may have implications for the future behavior of investment in other countries. Although the economies of the two countries have begun to grow once again, private investment spending has not led the current recoveries, as it did in earlier

[6] Government estimates of the cost of such programs are not available.

Chart 3

Private Residential Investment: A Cyclical Comparison



Sources: Central Bank reports; Statistics Canada, *Canadian Economic Observer;* Central Statistical Office of the United Kingdom, *Monthly Digest of Statistics;* INSEE, *Information Rapides.*

Note: In Germany the "construction" measure includes business construction. Unpublished residential construction data portray qualitatively similar behavior.

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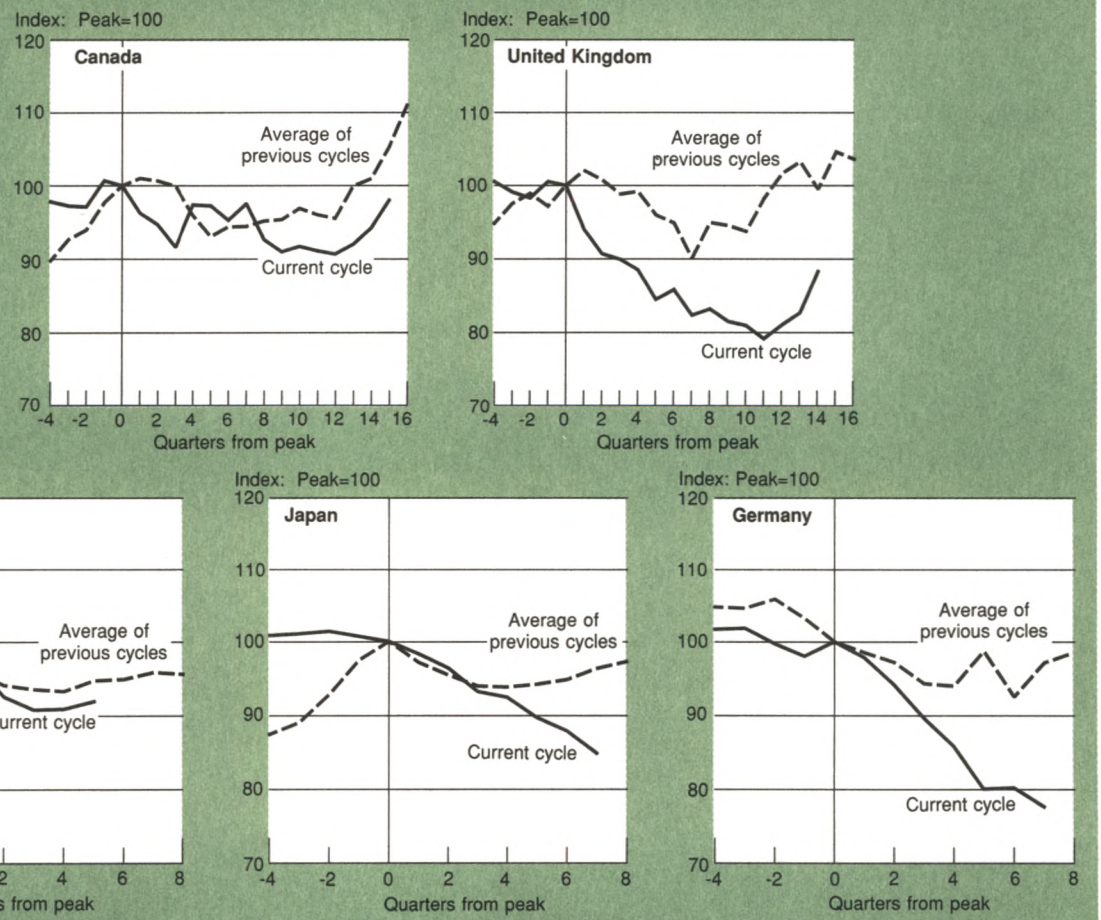
business cycles. Indeed, investment spending has remained significantly depressed relative to its behavior in earlier recessions. The evidence presented so far suggests that high real interest rates contributed to the relative weakness of investment in the current cycle. Since real rates remain high in France and Japan, it is likewise possible that investment may not contribute as strongly to economic recovery in these countries as it did in the past.

To be sure, factors other than high real interest rates may have weakened investment abroad during the 1990s. The worldwide investment boom of the late 1980s may have left firms with excess capacity, prompting them to scale back on investment in the early years of the next decade. The relevance of the earlier investment boom is not strongly supported by capacity utilization data, however, since in most of these countries capacity utilization rates have fallen no more (and in some cases less) during the most recent recession than in past recessions. Alternatively, weak output growth may have generated weak investment, rather than the reverse. Output and investment depend on each other, of course, and causal relations between them are not easily sorted out. Nonetheless, a striking pattern across all of the countries under consideration suggests that investment was the drag on GDP: the GDP decline early in the recent recessions was less rapid than was typical, while the decline in business investment (and housing

Chart 4

Private Business Investment: A Cyclical Comparison



Sources: Central Bank reports; Statistics Canada, *Canadian Economic Observer;* Central Statistical Office of the United Kingdom, *Monthly Digest of Statistics;* INSEE, *Information Rapides.*

Note: In Germany the category "business investment" includes only machinery and equipment. In the other countries the category also includes nonresidential construction.

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investment where it was not otherwise supported) was more rapid than normal.

Some may wonder whether the relationship between investment and real interest rates suggested here is overly simplistic. For example, it may be argued that the influence of changes in real interest rates has been neglected relative to the influence of interest rate levels. The relationship between the cost of capital and investment is indeed complex; both the levels and the changes in interest rates are potentially important, the relationship may well vary over time,[7] and, in the data, the relationship may be obscured by the influence of factors such as expectations about future demand conditions.[8] Nonetheless, complexities exist in all areas of economics, and yet strong, simple relationships do occasionally become apparent. In pointing out the consistency across countries in the high level of real interest rates and the weakness of investment, this article suggests that the link between foreign interest rates and investment in the 1990s may be just such a relationship.

Consequences of high real interest rates abroad: Numerical measures

Just how much did high real interest rates depress foreign private investment during the 1990s? To evaluate the effects of these unusually high rates, we turn to four standard macroeconomic models.[9] Although the investment sectors of these models are not explicitly available to us, we can examine the effect of high real interest rates on total output. Interest rates are thought to have their strongest impact on investment, so it is reasonable to assume that investment accounts for the lion's share of the output effects discussed below. Output itself grew significantly more slowly during the 1990s than during historically comparable periods (Chart 5). The simulations may clarify the extent to which this relatively slow growth can be attributed to high real interest rates.

To carry out the simulations, we first calculate the gap between real interest rates in the 1990s and those of comparable earlier cycles, using a weighted average of the interest rates of the foreign G-7 countries. We find that on average during 1990-93, these real rates were 5.1 percentage points higher than rates from previous comparable cycles.[10] The simulations measure the extent to which output for the major industrialized trading partners of the United States, taken as a group, would have differed if that gap had not existed in the 1990s.

The simulations suggest that output would have been substantially higher in these countries had real interest rates been lower. Chart 5 shows these counterfactual results as a dot-dashed line. The line indicates the level that output might have reached had all the major determinants of

[7] Economists have long noted that rising real interest rates would initially lead to a drop in investment as firms tried to let their capital stock decline to a new, lower level. Once the desired level was achieved, however, investment would once again accelerate so that the capital stock could be maintained at that level, even if the real interest rate remained unchanged. Thus one rise in real rates will trigger more than one investment response over time. In addition to this source of ambiguity about the relationship between interest rates and investment, substantial lags separate changes in rates from the associated adjustments in investment.

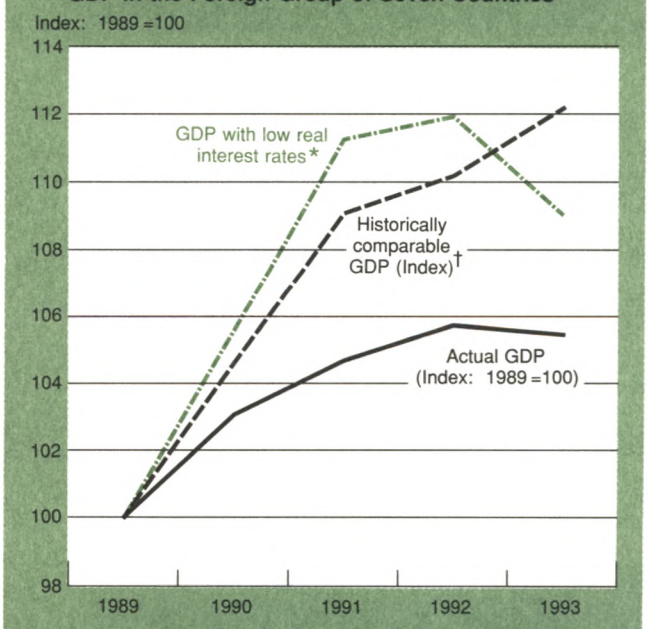
[8] For example, it seems likely that buoyant demand conditions during the late 1980s may have obscured the depressing effect of high real interest rates on investment at the time.

[9] The four models are the Multi-Country Model of the Federal Reserve Board of Governors, the international models of the Organization for Economic Cooperation and Development and the European Community, and the model of Wharton Economic Forecasters, Inc. The properties of these models are summarized in R. Bryant, ed., *Empirical Macroeconomics for Interdependent Economies* (Washington, DC: Brookings Institution, 1988). This volume analyzes the effects of monetary and fiscal shifts on economic variables but does not explicitly analyze the effects of an interest rate change taken in isolation. For this reason, the interest rate change reported here is associated with an expansion of the money supply. In using these simulations as a guide, it is effectively assumed that the historical behavior of these economies, including the historical relationship between money supply and real long-term rates, remains an adequate guide to their current behavior.

[10] We use here the same two cycles cited earlier in the article, one beginning in third-quarter 1974 and the other in second-quarter 1980.

Chart 5

GDP in the Foreign Group of Seven Countries



Note: The foreign G-7 countries are Germany, France, Japan, Canada, the United Kingdom, and Italy.

*The path of GDP if lower real interest rates had prevailed in 1990-93.

†The average path of GDP around the time of the recessions in the mid-1970s and early 1980s.

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investment in the 1990s been unchanged except for interest rates, which are assumed to equal their levels in historically comparable periods.[11] (To construct this line, we average the estimates from all four macroeconomic models.) The estimated economic effect of high real rates is visible as the gap between the solid and dot-dashed lines. The average size of this gap in any one year is around 4½ percent, implying a cumulative output loss in excess of 18 percent of GDP over 1990-93.

Had real foreign interest rates been consistent with their levels in earlier comparable cycles, output growth would not just have been higher by some margin, it might even have exceeded growth during these earlier cycles. In Chart 5 this possibility is represented by the fact that the counterfactual GDP line from 1989 to 1992 runs above the GDP line for historically comparable periods. Output in the low-interest-rate counterfactual presumably would have more closely tracked output in historically comparable periods if high real interest rates had been the primary source of atypical weakness in output *and* if the high rates' negative effects had not been offset by such factors as fiscal policies. But because the effects of the high rates were offset to some degree by special forces, the influence of those forces would naturally result in higher output in the counterfactual scenario than in historically comparable periods.[12]

[11] GDP for the group as a whole was generally increasing, even though all these countries experienced recession at some point in the decade. The positive growth for the group results from the staggering of individual countries' recessions: Canada and the United Kingdom entered recession as early as 1990; they were recovering as Germany, France, and Japan entered recession in 1992.

[12] Counterfactual output falls below historically comparable levels in 1993. This drop presumably reflects the influence of factors other than interest rates, such as the appreciation of the yen and concurrent fiscal tightening in the United Kingdom, Italy, and other countries.

The reader may also have noted that the total estimated effect of high real rates increases over 1990-91 and then declines. The initial increase reflects (1) the time required to bring interest rates down to historically average levels, and (2) the time required for choosing and implementing investment projects. The later decline in the effect of high real rates largely reflects the downward trend in foreign real interest rates during the 1990s. Because of this decline, the gap between actual interest rates and their historically comparable levels was narrower in 1992-93 than in 1990-91. We are essentially measuring the impact of this gap, and the decline in the gap implies that the measured impact of unusually high rates would have declined as well.

A caveat is in order: our estimates of the effects of high real interest rates on foreign output are not intended to be precise, and should be taken instead as indicative of the effects' order of magnitude. One reason for viewing the estimates with caution is the great diversity of results obtained from the four models, which suggest average annual effects ranging from 1½ to 8 percent of GDP. Note, however, that even the lowest of these estimates suggests that the aggregate output loss was sizable. An additional source of uncertainty about these estimates is our calculation of interest rates from historically comparable periods. Since the historical average used here includes the negative rates that prevailed during the mid-1970s, these historically comparable rates may be lower than rates one would consider "historically normal," in which case our estimates of output loss would be too high. If we use as an alternative benchmark the average of real rates before 1973, the models indicate that the output loss for the foreign G-7 countries in the 1990s was 2½ percent per year, with a cumulative output loss close to 10 percent. Though these estimates are, as expected, lower than our central estimates, the total magnitude of the effect is still notable. Thus, our general conclusion seems quite robust: output and investment among our major developed trading partners would have been significantly greater if real interest rates there had been lower in the 1990s.

Conclusions

Historically high real interest rates abroad seem to have substantially depressed private investment in most of the foreign G-7 countries in the 1990s. This effect was most evident for private business investment, which was unusually weak in all the countries considered. The negative effects of high real rates on private housing construction were quite apparent in Canada and the United Kingdom, but were masked by offsetting factors in France, Japan, and Germany. Prominent among these factors were stimulative fiscal policies, introduced once these countries' recessions began in earnest. For this reason, the high rates have likely produced a smaller loss of investment, output, and jobs than historical experience would have suggested, but at the cost of larger fiscal deficits.

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Second District Update: A Moderate Recovery Is in Progress

by Rae Rosen and John Wenninger

A broad-based, moderate recovery is unfolding in the Second District. Revised employment data released in March show that the labor market turned up in late 1992—considerably earlier than indicated by the preliminary data. Nonetheless, the improvement in the regional economy still lags the national recovery, and jobs in all major sectors of the local economy have not developed as rapidly as in the rest of the nation. Despite the weak growth in employment, growth in personal income has picked up over the past two years, driven by robust gains in compensation in the securities industry. Other signs of expansion in the District include stronger retail sales, a greater volume of exports, growth in single-family home construction, and declining vacancy rates for commercial office space. Taken together, these economic indicators augur well for a continuing comeback in the Second District's economy.

Labor markets

Rising employment. Earlier this year, the annual "rebenchmarks" of the labor data for New York and New Jersey were released. These annual revisions correct for any miscount of employment in the preliminary data issued each month.[1] In this case, the revised data show that the District's nonfarm employment began to inch up as early as the third quarter of 1992, about one year earlier than was indicated by the preliminary monthly data (Chart 1). The basic picture of a weak labor market in this District has not been changed, however.[2] Relative to employment in the country as a whole, employment in the Second District peaked earlier and declined for a longer period. Thus far, it has not come close to recouping the jobs lost during the recession, while nonfarm employment at the national level exceeded its earlier peak by late 1993.

We can put this subpar performance in employment in some perspective by applying the national growth rates to each sector of the District's economy. This exercise shows how the actual level of jobs compares with the number of jobs that would have been achieved had the region's economic performance in every sector matched that of the nation. We find that the shortfall created by the slower local growth was about 500,000 jobs since the first quarter of 1991 (see table).

While goods-producing industries such as manufacturing and construction contributed to the weak performance of the region, service employment was the dominant factor in the overall shortfall. Underperformance pervaded all service categories, including industries considered District strongholds such as business services, legal services, and finance. Given this weak employment performance, both in absolute terms and relative to the national trends, it is not surprising that the District has suffered from relatively high unemployment rates and continued out-migration.

Declining unemployment. Since mid-1992, unemploy-

[1] The preliminary data are based on monthly sample surveys of establishment employment. If some industrial sectors are underrepresented in the sample (or, less frequently, overrepresented), then the release of more complete information can entail significant revisions. Similarly, if an unusually large increase in new business formations occurs, the job growth at those companies is unlikely to be captured in the preliminary monthly survey but will be incorporated in the rebenchmarked data.

[2] The revisions had the greatest impact in New Jersey, adding 15,000 jobs in 1992 and 84,000 jobs in 1993 to the average level of employment. For New York, the job count did not change appreciably in 1992 but increased by 30,000 in 1993. For the two states combined, the upward revision of 114,000 jobs in 1993 means that the average level of employment increased 0.4 percent that year rather than declining 0.3 percent.

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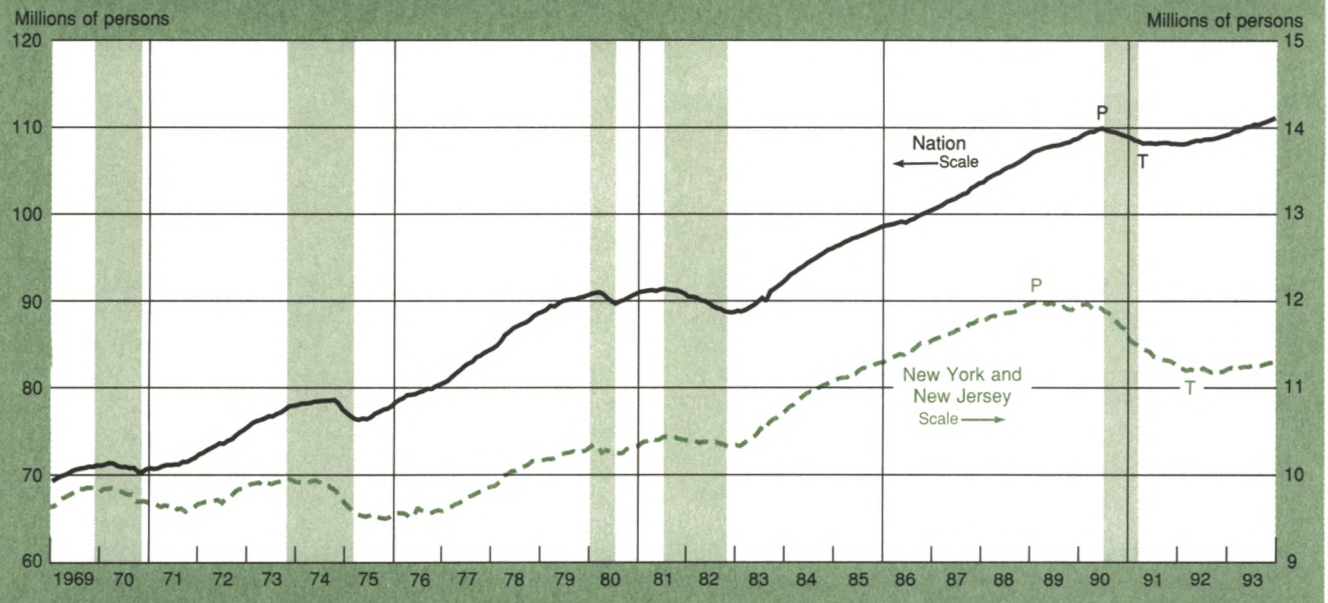
ment has declined in both the United States and the region. Nevertheless, unemployment rates in New York and New Jersey had peaked at much higher levels than the national rates before they began their fall, and today regional unemployment remains above the U.S. average (Chart 2). This winter, the downtrend in unemployment in New York and New Jersey was apparently interrupted by the unusually harsh weather, which disrupted retail sales activity and slowed construction work.[3]

[3] This departure from the 1993 trend in unemployment rates may also reflect discontinuities in the data. The Bureau of Labor Statistics recently revised its method of data collection, incorporating information from the 1990 Census of Population in its 1994 household employment and unemployment data. The revisions significantly increase the number of

Chart 1

Employment: New York, New Jersey, and the Nation



Sources: Bureau of Labor Statistics; Federal Reserve Bank of New York.

Notes: "P" and "T" indicate the peak and trough of the national and local employment data. Shaded areas indicate periods designated recessions by the National Bureau of Economic Research.

Second District Employment Shortfall

	Percentage Distribution of Employment		Annual Percentage Growth (3/91–12/93)		Absolute Percentage Difference	Second District Shortfall (Thousands of Jobs)
	Second District	Nation	Second District Average	U.S. Average		
Employment						
Total	100.0	100.0	–0.6	1.0	–1.6	–521
Goods-producing	15.9	20.9	–3.8	–1.4	–2.3	–126
Service-producing	84.1	79.1	0.1	1.6	–1.5	–395
Retail trade	14.7	17.9	–0.9	1.1	–2.0	–98
Wholesale trade	5.4	5.5	–1.8	0.2	–2.0	–39
Business services	8.3	5.2	3.4	6.3	–3.0	–54
FIRE†	9.4	6.0	–1.2	–0.2	–1.0	–26
Other services	46.4	44.5	0.4	1.6	–1.2	–176

Sources: Bureau of Labor Statistics; Federal Reserve Bank of New York.
† FIRE is the acronym for finance, insurance, and real estate.

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The longer run decline in the regional unemployment rates since mid-1992 may not stem entirely from improved labor market conditions. The sluggish growth in jobs has encouraged out-migration from the region, and the region's labor force has contracted (Chart 3). If the labor forces in New York and New Jersey had maintained their 1990 levels, unemployment rates for 1993 would have averaged 1.6 percentage points higher in New York and 1.4 percentage points higher in New Jersey.[4]

Income and consumption

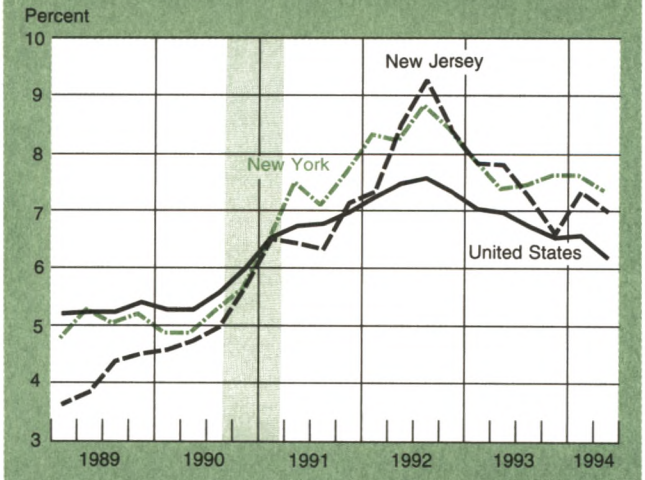
Personal income. Despite the subpar employment situation, nominal personal income has followed the national pattern of more rapid growth in 1992 and 1993, accelerating from relatively weaker growth in 1991 (Chart 4). The low-to-moderate gains in compensation in most sectors of the District's economy in 1992 and 1993 have been augmented by unusually strong compensation growth in the securities industry. This broader based expansion in compensation over the past two years contrasts sharply with the pattern in 1991, when compensation in most sectors other than securities was stagnating or declining.

In the second half of 1993 (fourth quarter over second quarter), nominal personal income rose at a 2.7 percent annual rate in New York and New Jersey, an increase well below the national gain of 5.2 percent during the same period. Nevertheless, the regional performance for the second half of 1993 may have been stronger than the available data suggest. The personal income figures for the region are still preliminary and are almost always revised upwards in subsequent periods, sometimes significantly so. The

Footnote 3 continued
working and nonworking people in the labor force in New York and New Jersey. However, the Bureau of Labor Statistics did not adjust the data before 1994 for the changes in the size of the labor force or the changes in the method of data collection, nor did it develop new seasonal factors for the new 1994 data. As a result, the unemployment rates from 1993 and 1994 are not strictly comparable and the longer run trend may be the better indicator.

[4] The regional labor force grew moderately in the fourth quarter of 1993, but it is too soon to know whether this uptick is a turning point or simply a pause (comparable to that in the second quarters of 1991 and 1992) in the longer run decline of the regional labor force.

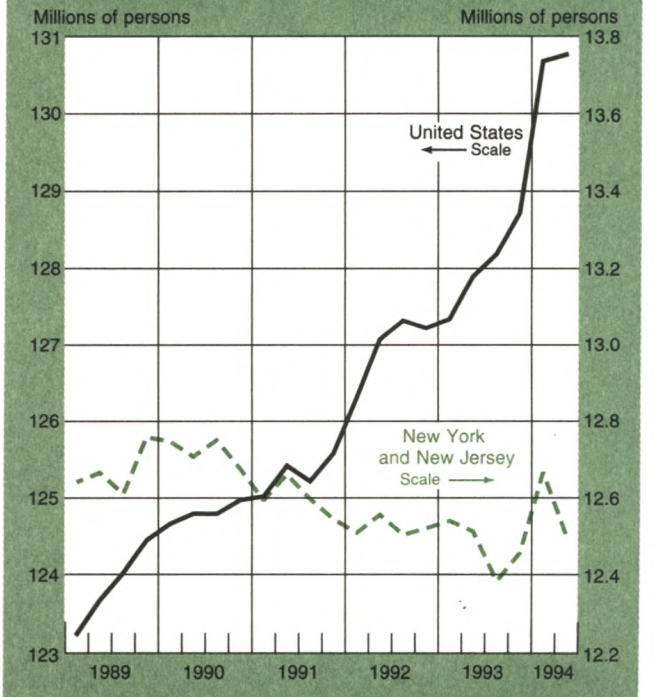
Chart 2
Unemployment Rates
Seasonally Adjusted Data



Sources: Bureau of Labor Statistics, Household Employment Survey; Federal Reserve Bank of New York.

Notes: The recent redesign of the household survey limits the comparability of data before and after January 1994. Second- quarter 1994 values for New York and New Jersey are based on April-May data. Shaded area indicates period designated a recession by the National Bureau of Economic Research.

Chart 3
Labor Force: New York, New Jersey, and the Nation
Quarterly Average



Source: Bureau of Labor Statistics, Household Employment Survey.

Notes: The recent redesign of the household survey limits the comparability of data before and after January 1994. Second-quarter 1994 values for New York and New Jersey are based on April-May data.

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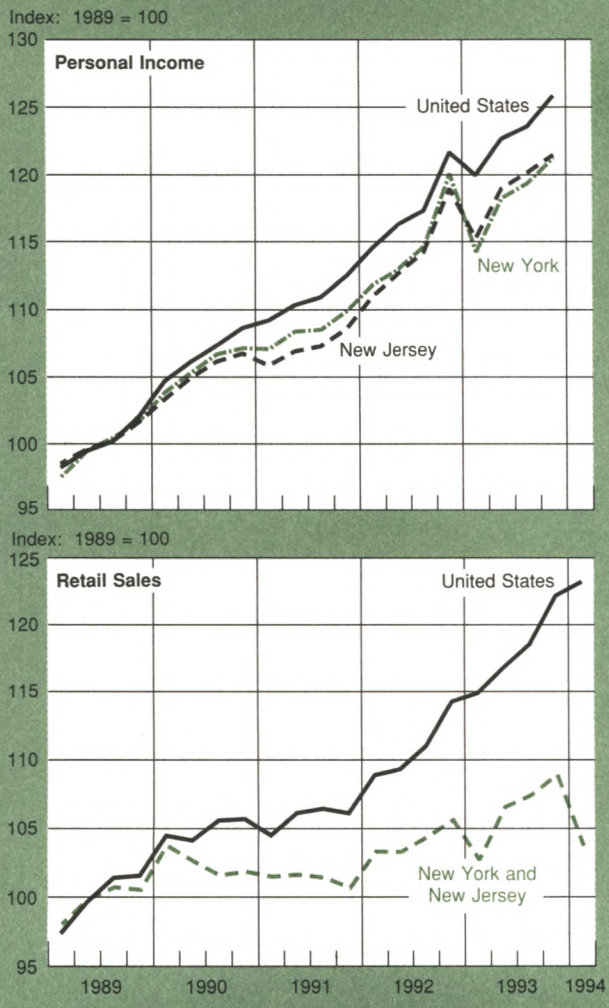
revisions will reflect not only more complete data on insured payroll employment, but also more precise information on bonus payments in the securities industry, a major source of regional income.[5]

[5] These bonuses are typically paid out over the December-January period, but in 1992 the payments were accelerated to avoid the anticipated federal tax rate increase in 1993. The earlier payments caused personal income to spike at the end of 1992 and to drop substantially in the first quarter of 1993, making it difficult to discern the underlying trends in personal income during this period.

Chart 4

Trends in Income and Sales

Seasonally Adjusted Data



Sources: Bureau of Economic Analysis; Bureau of the Census.

Note: First-quarter 1994 values for retail sales in New York and New Jersey are based on January-February data.

Retail sales. More widespread and rapid growth in nominal personal income over the past two years has supported somewhat stronger gains in nominal retail sales. Like the advances in employment and personal income, however, the gains in the District's retail sales are well below the national gains. On a year-over-year basis, retail sales in the region rose 3 percent in the last six months of 1993, while sales at the national level advanced nearly twice as fast—about 6 percent—over the same period (Chart 4).

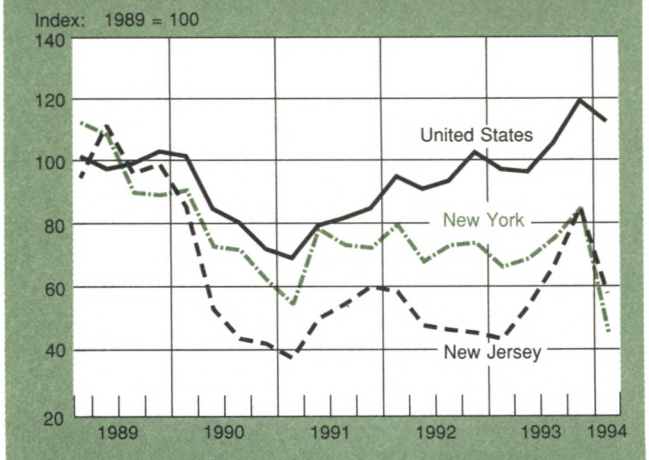
This year, despite unusually poor weather in New York and New Jersey, sales in the District and the nation maintained this differential performance through the first two months of 1994. In March, however, anecdotal evidence presented in the Federal Reserve "Beige Book" suggested that the District's sales accelerated considerably. Area merchants had anticipated good year-to-year comparisons this March because of the weak sales in 1993 and the early Easter in 1994. However, most merchants reported that sales were significantly stronger than these developments had led them to expect.

Housing and construction

Permits for new construction. The District's construction of new housing has also been lagging behind the national trend. At the national level, permits for one-to-four-family homes have been growing since early 1991. In contrast, at the District level, permits were relatively flat from early

Chart 5

Permits for One-to-Four-Family Homes



Source: Bureau of the Census.

Note: First-quarter 1994 values for New York and New Jersey are based on January-February data.

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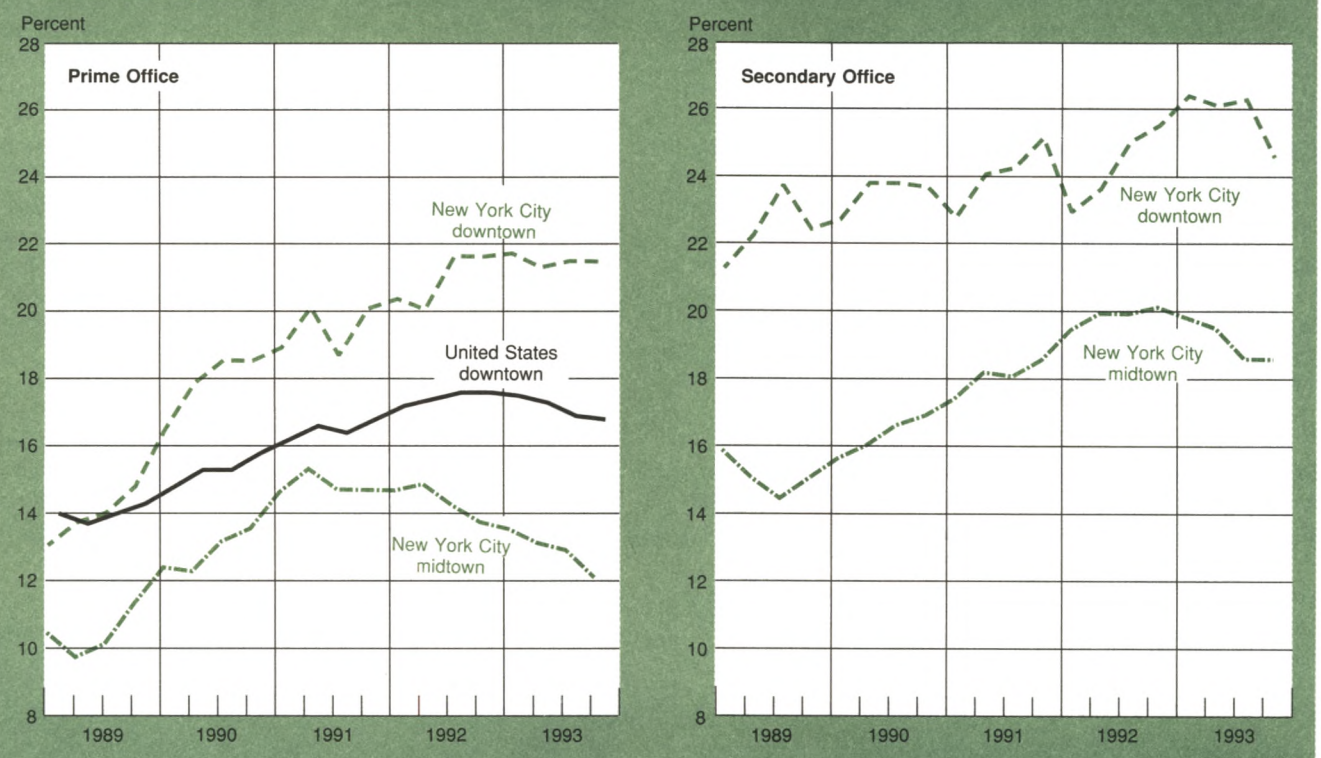
Chart 6

Office Vacancy Rates



Source: Cushman and Wakefield, *Marketrend.*

1991 to early 1993, but accelerated sharply during the remainder of 1993 (Chart 5).[6] Existing home sales also quickened in the last six months of 1993, rising 27 percent in New Jersey and 14 percent in New York from second-quarter 1993 to fourth-quarter 1993. Severe winter weather reduced permit activity in the first quarter of 1994, but the cumulating economic data suggest that the underlying uptrend remains intact.

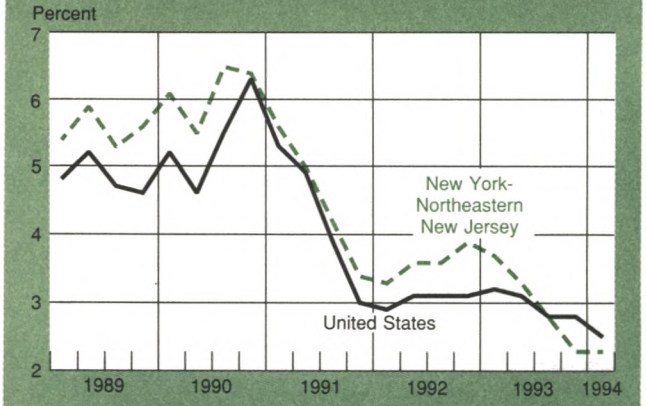
Commercial office construction. Although no regional recovery in commercial office construction is in sight, the market for existing office space may be improving. Sales of large office buildings are taking place again in Manhattan, and vacancy rates are beginning to decline throughout the metropolitan area, including Manhattan (Chart 6), northern New Jersey, Long Island, and Westchester.

The vacancy rate for prime commercial office space in mid-Manhattan is actually below the national rate for central business districts, but the rates in the metropolitan area

Chart 7

Declining Inflation Rates

Year-over-Year Percentage Change in the Consumer Price Index



Source: Bureau of the Census.

[6] This increase still leaves the region's home building about 20 percent below its early 1989 level, while for the nation, permits are 20 percent above their 1989 level.

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as a whole remain quite high by historical standards.[7] Furthermore, overall vacancies still stand well above the 7 percent rate recognized by the real estate industry as sufficiently low to prompt new construction of prime commercial office space. Hence, we can expect little office construction in the coming quarters, and the absence of this activity will differentiate the current regional recovery from the preceding one, when office construction triggered a period of relatively strong growth.

Similarly, vacancy rates for secondary office space appear to have peaked, but the levels remain high. Because facilities in secondary office buildings are frequently obsolete and the office work force is growing slowly, many in the real estate industry expect a significant number of these buildings to remain vacant until they are razed to make way for new construction.

Consumer price inflation

As a result of the relatively weaker performance of the Second District's economy, regional inflation plummeted from a level well above the national one in late 1992 to a rate below that of the nation by the end of 1993, and the relative improvement has carried over into the early months of 1994 (Chart 7). During the prior expansion, the greater New York-New Jersey metropolitan area experienced consumer price inflation well in excess of the nation's, and its competitive position consequently declined.

High costs for shelter were largely responsible for the differential between the regional and national rates of inflation during the 1980s.[8] More recently, the weakness in existing home prices and rental rates for apartments has moderated the cost of shelter in the greater New York metropolitan area (Chart 8). The resulting improvement in the region's overall relative price performance should help to promote growth in the future.

Prospects for growth

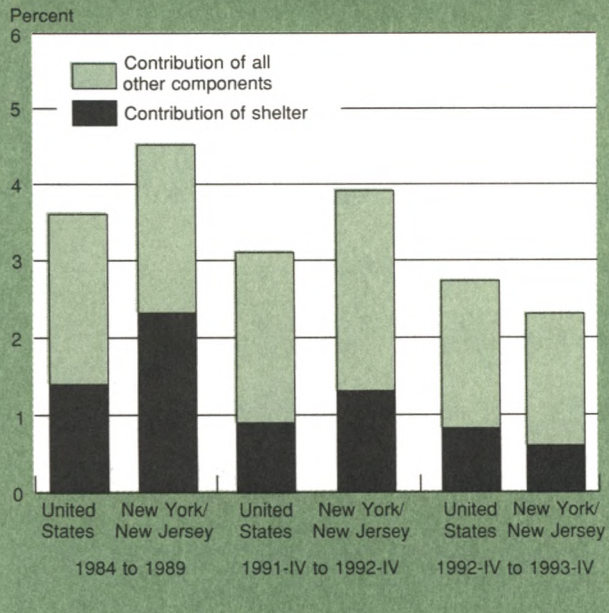
Except for commercial office construction, the economic indicators discussed in this article suggest that the regional decline has ended and that a broad-based, moderate

[7] Demand for midtown Manhattan's prime office space has increased with relocations from lower Manhattan and tenant upgrading from secondary space to prime office space. Elsewhere in the nation, many firms have moved from central business districts to suburban locations, a pattern that has raised the vacancy rate of central business districts.

[8] Rae D. Rosen, "Recent Developments in New York City's Economy," FRBNY Quarterly Review, Summer 1993.

Chart 8

Shelter Cost and the Consumer Price Index

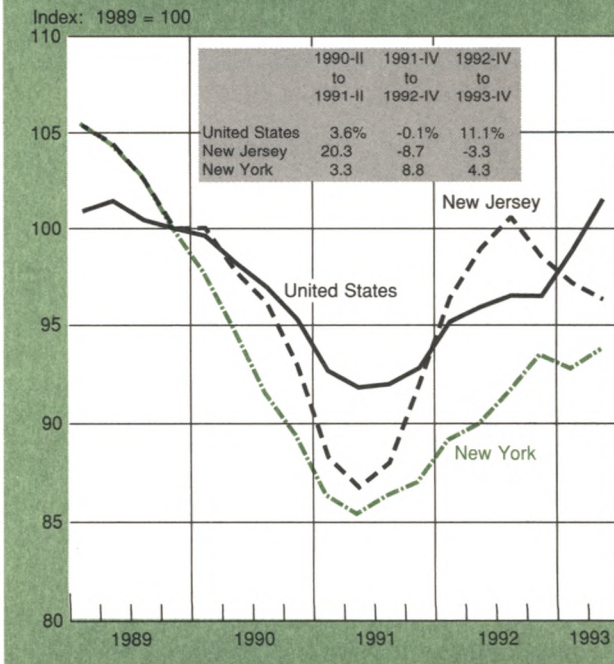


Source: Bureau of the Census.

Chart 9

New Business Incorporations

Four-Quarter Moving Average



Source: Dun and Bradstreet.

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Box: Sources of Job Growth in New York State

Table A1

Job Growth by Firm Size

Thousands of Jobs

Number of Employees in Firm	Net Job Growth					Summary 1984–88			
	1984	1985	1986	1987	1988	Gains at New Firms	Net Loss at Existing Firms†	Net Growth	Net Growth (Percentage Distribution)
Less than 10	47	57	53	67	66	534	– 244	290	35
10 to 25	46	49	56	55	51	469	– 212	257	31
25 or more	155	92	11	12	7	1289	–1012	277	34
Total	248	198	120	134	124	2292	–1468	824	100

Source: New York State Department of Labor, Covered Employment and Wages.
Note: All data are as of March.
† Jobs lost because of firm failures plus changes in jobs at firms remaining in business. Represents changes in jobs at firms existing in base year.

We wish to thank Jay M. Mooney and the New York State Department of Labor for their help and cooperation in developing the data for the following analysis.

What kinds of firms are generating the jobs—new firms or old firms, large or small companies? With New York's labor market beginning to recover, a look at the sources of job growth over a five-year period during the previous expansion (1984-88) might tell us where the jobs will most likely be created in the current recovery. Tracking the creation of jobs, however, is not a straightforward exercise. New firms start up as old firms fail. Firms grow and contract, changing their size classification. In addition, some firms have multiple locations, each counted as a separate establishment in many data sets. Finally, the results derived from an analysis of one industry may not be applicable to other industries or the overall regional economy.

To obtain some estimates of job growth by firm size and age that would be free of these difficulties, we asked the New York State Department of Labor to derive employment by firm size from the insured employment data base—a data base that covers almost all private nongovernment employment. The data were consolidated at the firm (not establishment) level on a year-by-year basis into three firm-size classifications: fewer than ten employees, ten to twenty-five employees and more than twenty-five employees. For each year and each size category, we then calculated the drop in employment due to failure of existing firms plus any changes in employment at firms remaining in business. This figure represents the net change in employment at firms that had been operating in each base period. Sufficient business failures occurred each year to cause net employment at firms in business in the base period to decline from year to year. Next, for each size category, we calculated the difference between total employment and employment at the firms in business in the base year. This difference can be interpreted as net job growth at newly created firms. Finally, before doing the calculation for the next year, we reclassified those firms that had grown (or contracted) by large enough amounts to change size classification.

Table A2

Failure Rate by Firm Size

Percent

Number of Employees in Firm	1984	1985	1986	1987	1988
Less than 10	15.9	16.4	16.3	16.4	16.9
10 to 25	7.3	7.7	7.7	7.8	8.1
25 or more	5.4	5.9	6.3	6.0	6.9

Source: New York State Department of Labor, Covered Employment and Wages.
Note: All data are as of March.

Table A1 shows that job growth in the 1984-88 period was concentrated in firms belonging to the first two size categories, that is, firms with twenty-five or fewer employees (extreme right column). Although these firms accounted for only about 25 percent of total private employment, they added over 60 percent of the new jobs. Within this group, the job growth was about evenly split between firms with fewer than ten employees and firms with ten to twenty-five employees. As noted, job growth at firms remaining in busi-

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Box: Sources of Job Growth in New York State (*Continued*)

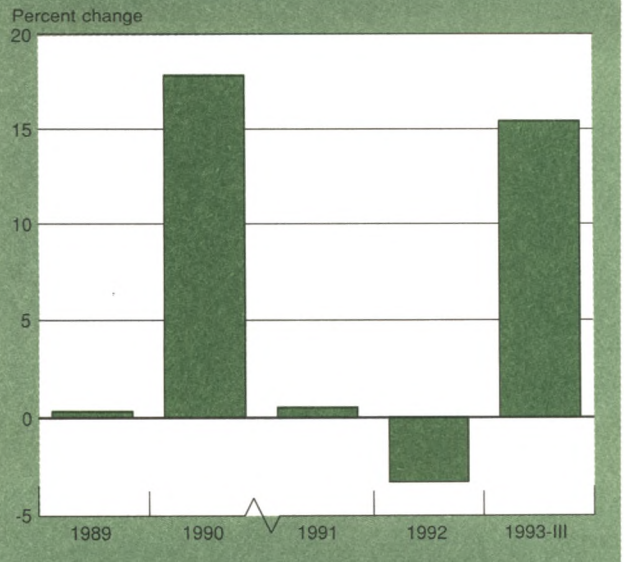
ness was not large enough to offset the losses at firms that failed, resulting in a net reduction in total jobs at firms operating in the base year (Table A1, third column from the right). However, this negative impact on jobs was more than counterbalanced by the growth in jobs in new firms for each size category (Table A1, fourth and second columns from the right).

New small firms are clearly a dynamic part of the job creation process in this District. Nevertheless, the smallest firms may provide jobs that are less stable than those at large firms. Firms with fewer than ten employees failed at a rate two to three times that for firms with ten to twenty-five employees, or firms with more than twenty-five employees (Table A2). Hence, while smaller firms with less than twenty-five employees contributed more than half of the job gains in 1984-88, the jobs at the smallest of these firms were quite vulnerable to business failure, creating considerable churning in this segment of the labor market.

With many of the large firms in this region downsizing and outsourcing work, it appears likely that job growth in the current recovery will again be dominated by job creation in smaller firms. And if the past is any guide, these smaller firms will probably have a higher failure rate, making the jobs created less stable than those at large firms. Nonetheless, jobs at many large corporations are also becoming less secure as these firms reduce employment to contain costs. Hence, the District's labor market in general will probably enjoy less employment stability during the 1990s than it did in the 1980s.

Chart 10

Recovery in Exports of Goods Manufactured in New York and New Jersey

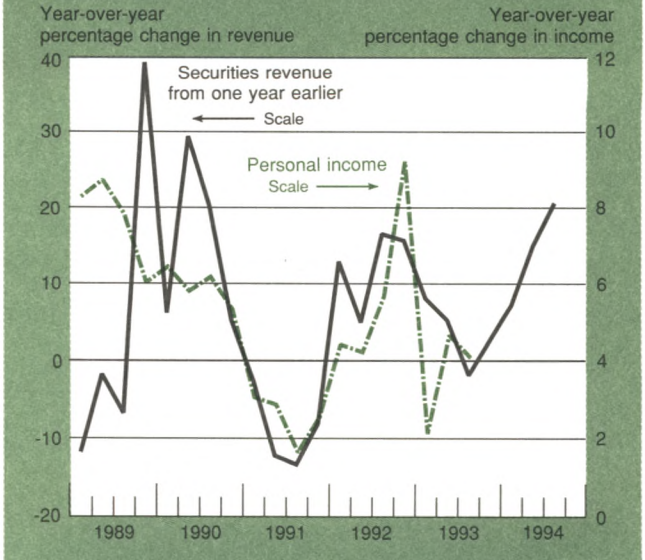


Source: Massachusetts Institute for Social and Economic Research, University of Massachusetts, Amherst.

Note: Pre-1991 data are not strictly comparable with more recent data.

Chart 11

Securities Industry Revenues Relative to Personal Income in New York State



Sources: Securities Industry Association; Bureau of the Census; Federal Reserve Bank of New York.

Note: Industry revenues are plotted with a four-quarter lead. For example, the first-quarter 1993 observation is plotted as a first-quarter 1994 value.

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expansion is in progress. Can the expansion be sustained? Three factors suggest that the momentum is unlikely to falter in the period immediately ahead.

First, improving business confidence points to support for sustained growth in the District. Since mid-1991, new business formations have been developing in the region quite rapidly on average, although in New Jersey formations have slowed slightly over the past year (Chart 9). In addition to signaling changes in business confidence, the more rapid emergence of new firms means expanded job opportunities. Our analysis of employment data in New York suggests that new business formations have been a primary source of job growth in New York State (see box on page 51). However, since many of the new firms are small, these new jobs are probably less secure than jobs at large companies because small firms have significantly higher failure rates.

Second, the regional economy has benefited from the recent growth in exports to Canada—the single largest export market for New York and New Jersey—and from increased exports to the United Kingdom and Switzerland, respectively the second and fourth largest export markets for the District (Chart 10).[9] If these markets continue to expand, their demand for exports from the Second District will help sustain the region's recovery.

Third, the vigorous performance of the securities industry in 1993 should contribute to income growth in the District during the next several quarters.[10] In recent years, a fairly consistent lagged relationship has prevailed between growth in personal income in New York State and the revenues of the securities industry, with the current income numbers reflecting the performance of the securities industry four quarters earlier (Chart 11).[11] A somewhat looser relationship, with a slightly longer lag, exists between personal income in New Jersey and the revenues of the securities industry.

Over the longer run, the securities industry may also provide a relatively more stable source of income than it has in the past. Once largely dependent on the income from commissions, which is driven by volatile stock market volumes, the securities industry now derives an increasingly larger share of its revenues from fees and product-related income. During the past ten years, fees and product-related income as a share of revenues have increased from 17 to 28 percent, while commissions as a share of revenues have fallen from 28 to 19 percent.[12]

Summary

For the most part, the economic indicators show that a moderate, broad-based recovery is under way throughout the Second District. Recent revisions in the labor data indicate that the District's employment began to grow in late 1992, while most other indicators suggest that the region's economic recovery may have begun somewhat later, probably during the second half of 1993. Even though the region's comeback trails that of the nation in most respects, it does appear sustainable. A higher volume of exports, increased business formations, and the strong performance of the securities industry all point to a continuing recovery for the period ahead.

[9] New York State is the second or third largest exporter of goods in the nation (New Jersey ranks thirteenth). If services were included in the calculation, New York would be first by a large margin.

[10] For the third consecutive year, the Securities Industry Association reported record revenues and profits. In fourth-quarter 1993, total revenues reached $19.5 billion and total compensation rose to $8 billion, respective gains of 24 and 27 percent over fourth-quarter 1992 levels.

[11] Although the industry employs a small fraction of the labor force in New York and New Jersey, it can account for a significant share of the growth in compensation. In 1991, for example, fully 40 percent of the increase in total compensation in New York State was paid to the securities industry—which represented just 2 percent of the state's work force. Compared with the construction or manufacturing industries, the securities industry has a narrow employment base and limited nonlabor factors of production, features that would tend to make the income multiplier for the securities industry comparatively low and slow.

[12] Securities Industry Association, Securities Industry DataBank. Other sources of revenue such as trading and underwriting have maintained relatively constant shares of revenue over this ten-year period.

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Monetary Policy and Open Market Operations during 1993

Overview

During 1993, monetary policy continued to be directed toward sustaining the economic expansion while encouraging progress toward stable prices. In the preceding few years, the pace of economic activity had been held back by several forces, including business and household efforts to improve financial positions, cutbacks in defense spending, a struggling real estate sector, and concerns about employment opportunities. To counter these influences, the Federal Open Market Committee had substantially eased reserve pressures between 1989 and 1992 in a series of gradual steps. Although the factors that had restrained economic activity in these years continued to be felt in 1993, their intensity appeared to diminish as the year progressed. Meanwhile, the stimulus provided by an accommodative monetary policy and declining long-term interest rates was becoming increasingly apparent, and the expansion in economic activity steadily improved over 1993 after falling back sharply in the first quarter. Chairman Greenspan indicated during the year that policy at some stage would have to move toward a more neutral position as the economy overcame the "headwinds" that had been impeding its advance. But with the underlying momentum of the expansion still in doubt during much of the past year, monetary policy, as measured by the prevailing degree of pressure on reserve positions, remained unchanged.

Long-term interest rates fell dramatically in 1993, driven by disinflationary trends, a moderate pace of economic expansion, and improved prospects for credible fiscal restraint. These yields declined intermittently over the first three quarters of the year, reaching their lowest levels in two decades by mid-October. Declines in short-term rates during this time were tempered by the steady stance of monetary policy. Over the final months of the year, most interest rates retraced a portion of their earlier declines in response to a steady stream of statistics indicating that economic growth was accelerating and unused productive capacity diminishing. Even with this partial backup in yields, however, the net decline in longer term interest rates over the year was substantial, resulting in a significant flattening of the yield curve.

Falling interest rates had far-reaching effects on investment flows and credit market conditions. Corporate and municipal borrowers issued record amounts of new debt to lock in reduced funding costs. The combination of lower yields and an improving economy further eased lingering financial market strains. Debt-servicing burdens of borrowers were directly alleviated, and corporate profitability rose. The trend toward improved financial conditions was particularly apparent in the banking sector. Also during the year, the Treasury took steps to realize savings in its borrowing costs by shortening the average maturity of its debt.

The performance of the monetary aggregates in 1993 followed trends established over the preceding few years. The broader measures of money again grew very slowly during the year, lagging far behind income growth. The Federal Open Market Committee (FOMC) placed reduced emphasis on M2 as a monetary policy guide because of the

Adapted from a report submitted to the Federal Open Market Committee by Joan E. Lovett, Senior Vice President of the Bank and Manager of the System Open Market Account. Spence Hilton, Manager, Open Market Analysis Division, and Peter Kretzmer, Economist, Open Market Analysis Division, were primarily responsible for the preparation of this report under the guidance of Ann-Marie Meulendyke, Adviser, Open Market Function. Other members of the Open Market Analysis Division assisting in the preparation were Robert Van Wicklen and Theodore Tulpan. Jonathan McCarthy, Economist, Domestic Research Division, also assisted.

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uncertain relationship between this measure of money and income. Meanwhile, M1, boosted by rapid currency growth and the effects of record levels of mortgage refinancing activity, posted its third consecutive strong yearly advance.

The FOMC continued to express its formal policy objectives in terms of "the desired degree of reserve pressure," specifying an amount of seasonal and adjustment borrowing from the discount window believed to be consistent with federal funds trading around a given level. In practice, the relationship between borrowing and the federal funds rate had not been very dependable in recent years, and the Trading Desk had treated the borrowing allowance very flexibly. While banks in 1993 appeared to have become less reluctant to tap the discount facility because of their improving financial condition, routine borrowing remained very low. Sufficient reserves were generally provided to meet demands, and the spread between the federal funds rate and the discount rate was usually slight. Consequently, banks had little need or incentive to borrow.

The Desk continued to face large needs to add reserves in 1993, primarily because of the rapid growth of currency and transactions deposits. Thus, the Desk purchased a record $37 billion of securities during the year while selling none and redeeming $2 billion. The purchases were about equally divided between Treasury coupon securities and Treasury bills. The Desk also arranged a substantial volume of repurchase agreements (RPs) during the year to address short-term variations in reserve availability.

In formulating its reserve strategy within two-week maintenance periods, the Desk sometimes faced inconsistencies between forecasts of the reserve need, based on staff estimates of required reserves and the net reserve effects of operating factors, and the behavior of the federal funds rate. In these circumstances, it had to judge which indicator more reliably reflected the reserve picture. On those occasions when the Desk had reasonable confidence that a reserve need existed, it preferred to meet at least a portion of the estimated need, even without confirmation from the federal funds rate. For instance, reserve management practices at banks often caused the funds rate to be soft early in a maintenance period and on Fridays, although reserves were sometimes scarce. Banks attempted to avoid building up large excess reserve positions before the final days of a period for fear that they might not be able to eliminate them without risking an overnight overdraft in their account and the stiff associated penalties. When the Desk anticipated that the funds rate might fall below the expected level on a subsequent day despite a reserve shortage, it often executed fixed-term multiday repurchase agreements, rather than the standard withdrawable type, to ensure that the reserves stayed in place.

At times when the forecasts were believed to be less reliable than usual, the Desk gave more weight to the federal funds rate in planning its operations. Operating factors affecting reserves were especially difficult to forecast following major Treasury tax collection dates or in periods of exceptionally inclement weather. The Desk also tended to respond to the behavior of the funds rate if a failure to do so could have misled observers about the stance of Federal Reserve policy. That risk was mitigated somewhat in 1993, however, because market participants generally did not expect an imminent policy move.

The setting for policy

Economic activity and inflation

In 1993, many of the factors that had restrained the economic expansion during the preceding few years remained influential, but their intensity diminished over the year. Defense cutbacks, an overbuilt commercial real estate sector, and business and household efforts to restore financial health remained a drag on the economy. Moreover, a relatively slow pace of job formation, partially the outgrowth of ongoing corporate restructuring efforts, continued to weigh on consumer attitudes and to dampen household spending. As the year progressed, however, the impact of these restraining elements seemed to fade, while lower interest rates and the more accommodative monetary policy of the preceding few years were having a clear effect. When the pace of activity quickened over the second half of the year, the economic expansion appeared to have gained more solid footing.

For the year as a whole, real GDP grew just over 3 percent, about 3/4 of a percentage point less than in the previous year.[1] In the first quarter of 1993, economic growth fell back to less than 1 percent following a burst of activity in the final quarter of the preceding year (Table 1). Consumer spending almost came to a standstill, and net exports deteriorated sharply as the economies of many of the country's major trading partners remained mired in recession. In the following quarter, household spending rebounded, but net exports continued to shrink and businesses aggressively pared their inventories, leaving GDP growth at just under 2 percent. In the final two quarters of the year, consumer spending—particularly for more durable items—continued to climb, residential construction boomed as mortgage rates sank, and investment in equipment remained robust. A slight improvement in the U.S. net export position was also registered in the final quarter. As a result of these developments, GDP growth rose to about 3 percent in the third quarter and then surged to 7 percent in the fourth quarter.[2]

[1] This growth rate, and all annual increases reported in this section, are measured from the fourth quarter of 1992 to the fourth quarter of 1993. Reports of quarterly growth in this section are seasonally adjusted annualized rates.

[2] The recorded third-quarter growth rate was reduced modestly by the effects of summer flooding in the Midwest and drought in the Southeast.

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While economic activity steadily improved over the year, inflation as measured by most aggregate price indicators continued to subside (Table 2). Excluding the more volatile food and energy components, consumer price inflation slipped in 1993, and the level of producer prices was nearly unchanged on balance.[3] Nevertheless, the monthly performance of these price measures was uneven. Several discomforting price increases were reported early in 1993, followed by generally modest rises, and, at the producer price level, several declines.[4]

The improvement in inflation in 1993 partly reflected the persistence of unutilized productive resources in the economy. Still, evidence accumulated over the year that upward pressures on prices could be building. For one thing, increases in employment compensation showed no tendency toward further moderation. Moreover, when faster output growth spurred greater hiring over the second half of the year, the slack in labor markets diminished, as reflected in a falling unemployment rate. Excess capacity in product markets also dwindled, and by the end of the year capacity utilization rates in industry were nearing levels historically associated with firming price pressures.

Monetary aggregates

The broader monetary aggregates in 1993 lagged behind total spending growth in the economy, continuing the pattern set over the previous three years. Both M2 and M3 fell in the early months of the year, spurted briefly in the spring, then lapsed into a sluggish growth pattern over the remainder of the year. For the year as a whole, M2 increased only 1.4 percent, and M3 advanced a mere 0.6 percent (Charts 1A and 1B).[5] Ongoing structural adjustments at depository institutions, changes in attitudes toward debt, and the expanding array of borrowing and investment options avail-

[3] Movements in the total consumer and producer price series were affected by extreme weather in various agricultural areas, which distorted some commodity prices, and by falling energy prices late in the year.

[4] Several analysts felt this uneven pattern partly reflected measurement problems, including faulty seasonal adjustment factors, that exaggerated the reported increases early in the year, particularly at the consumer price level.

[5] The data on all the monetary aggregates are as of January 27, 1994, before the annual seasonal and benchmark revisions of February 3. The earlier data better represent the information available to the Committee when it was deliberating. The revisions available as of February 3 had little impact on total growth over the year. On balance, the revisions for all the aggregates tended to redistribute some of the growth from the last three quarters of the year into the first quarter. All annual changes of the monetary aggregates reported in this section are measured on a fourth quarter–to–fourth quarter basis.

Table 1

Real Gross Domestic Product and Its Components

Seasonally Adjusted Annual Rates of Change, Except as Noted

	1992-IV	1993 I	1993 II	1993 III	1993 IV	1991-IV to 1992-IV	1992-IV to 1993-IV
Real GDP	5.7	0.8	1.9	2.9	7.0	3.9	3.1
Change in inventory accumulation†	–0.9	20.6	–16.3	–6.5	2.0	1.6	–0.2
Final sales	5.8	–0.8	3.2	3.4	6.8	3.8	3.1
Consumption	5.6	0.8	3.4	4.4	4.4	4.0	3.2
Durables	13.2	–1.3	10.8	7.6	15.2	9.7	7.9
Nondurables	7.3	–2.1	2.7	3.7	2.7	3.6	1.7
Services	2.9	3.1	2.1	3.9	2.6	2.8	2.9
Producers' durable equipment	11.5	19.9	19.8	10.0	26.0	11.4	18.8
Nonresidential structures	–2.1	0.5	8.1	0.3	12.2	–2.0	5.1
Residential construction	32.8	1.5	–9.5	11.9	31.7	17.6	7.9
Change in net exports†	3.7	–21.1	–15.3	–11.1	1.8	–22.4	–45.7
Government purchases	–1.4	–6.4	4.2	0.3	0.0	1.1	–0.5
Addenda							
Saving rate (percent of disposable income)	6.0	3.9	4.4	3.8	4.0	1.1‡	–2.0‡
Industrial production	6.3	5.4	2.2	2.9	6.6	3.2	4.3
Capacity utilization rate (level)	80.4	81.1	81.2	81.4	82.3	1.1‡	1.9‡
Civilian unemployment rate (level)	7.3	7.0	6.9	6.7	6.5	0.3‡	–0.8‡
Change in nonfarm payroll employment (thousands)	298	517	547	389	503	786	1955
Change in manufacturing payrolls	–91	28	–121	–95	2	–358	–186

Note: Data are as of April 11, 1994.
† Billions of 1987 dollars.
‡ Change in rate.

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able to businesses and consumers contributed to the persistent weakness in the broader aggregates.[6] The Committee took the potential impact of these factors into account when it set relatively low growth ranges for M2 and M3 at the beginning of 1993.[7] By the time of the midyear review of the aggregates, the strength of the forces depressing M2 and M3 appeared to have been underestimated somewhat, and staff analysis suggested that velocity would continue to grow strongly over the balance of the year. In particular, stock and bond mutual funds, widely viewed as a readily available investment alternative to these aggregates, experienced robust growth.[8] Responding to these developments, the Committee lowered the ranges in July, a purely technical adjustment.[9] It turned out that both aggregates finished the year within the reduced ranges.[10] In July, the Chairman also indicated that M2 had been downgraded for use in guiding monetary policy because of the breakdown of the historical relationships between this measure of money and income.

In sharp contrast to the performance of the broader aggregates, M1 grew rapidly in 1993 for a third consecutive year. M1 rose 10.5 percent during 1993, and all the major components increased significantly (Chart 1C).[11] The extraordinary pace at which households refinanced mortgages in response to plunging mortgage rates, captured in Chart 2, led to rapid growth in demand deposits in many months and explains some of the strength in demand deposits over the year.[12] For currency, shipments abroad were again an important source of growth.

Financial developments

Yield movements. In 1993, a powerful rally in securities markets drove interest rates on intermediate- and long-term debt to levels not seen in twenty years. A sustained downward move in these yields began late in 1992 and extended into the final quarter of this past year, although it was punctuated by periods of consolidation and some backup in rates (Chart 3). By mid-October, yields on many longer term Treasury coupon securities had fallen 150

[6] These financial market developments have been described in some detail in previous editions of this report. The weakness in M2 before 1993 came despite a decline in conventional measures of the opportunity cost of holding these deposits. In 1993, the opportunity cost of holding M2 deposits turned up, a shift that could explain some of the continued weakness in that aggregate during the year.

[7] The range for M2 set in February was 2 to 6 percent, and the range for M3 was 1/2 to 4 1/2 percent. Both ranges were 1/2 percentage point lower than the provisional ranges for 1993 set the previous July.

[8] The popularity of these mutual funds was enhanced by the steepness of the yield curve and by hopes that capital gains in the bond and stock markets could be sustained. For 1993 as a whole, M2 plus stock and bond mutual funds grew by an estimated 5 1/2 percent.

[9] The range for M2 was reduced by 1 percentage point, and the M3 range was lowered by 1/2 percentage point.

[10] For total domestic nonfinancial debt, the Committee retained the monitoring range of 4 1/2 to 8 1/2 percent in February that it had selected the previous year, but it lowered the range by 1/2 percentage point at the July meeting. As shown in Chart 1D, this measure finished the year within its reduced range. Data are as of April 7, 1994.

[11] The strength in demand and other checkable deposits came despite a slight increase in the opportunity cost of holding these deposits following several years of decline. The effective rate paid on interest-bearing checkable accounts slipped in 1993, while market rates on other short-term instruments were fairly flat.

[12] Prepayment activity raises demand deposits with a short lag because servicers of refinanced mortgages typically hold the prepayments in these accounts before disbursing funds to holders of mortgage-backed securities. The effect on M1 is eventually reversed, however. The fact that refinancing was heavy in the final quarter of 1992 as well as in the last quarter of 1993 suggests that the impact of this activity on M1 growth for the entire year was limited. Staff estimates indicate that prepayment activity elevated M1 growth by about 3/4 of a percentage point.

Table 2

Price Information

Seasonally Adjusted Annual Rates of Change

	1992-IV	1993 I	1993 II	1993 III	1993 IV	1991-IV to 1992-IV	1992-IV to 1993-IV
Consumer price index							
Total	3.3	3.0	3.1	1.9	3.0	3.1	2.8
Excluding food and energy	3.5	3.6	3.4	2.5	2.9	3.5	3.1
Producer price index							
Total	1.6	1.4	3.7	-3.7	-0.1	1.6	0.3
Excluding food and energy	4.6	2.6	1.2	-4.7	2.2	2.0	0.3
Implicit GDP deflator	3.3	3.6	2.3	1.6	1.3	2.8	2.2
Fixed-weight GDP index	3.3	4.3	2.6	2.3	2.2	3.4	2.8
Employment cost index†	3.9	3.8	3.5	3.4	3.4	3.4	3.5

Note: Data are as of April 11, 1994.

† This index covers civilian workers and is computed for the final month of each quarter. The growth rates represent annualized changes from the final month of the previous quarter.

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Chart 1A

M2: Levels and Target Ranges

Cones and Parallel Bands

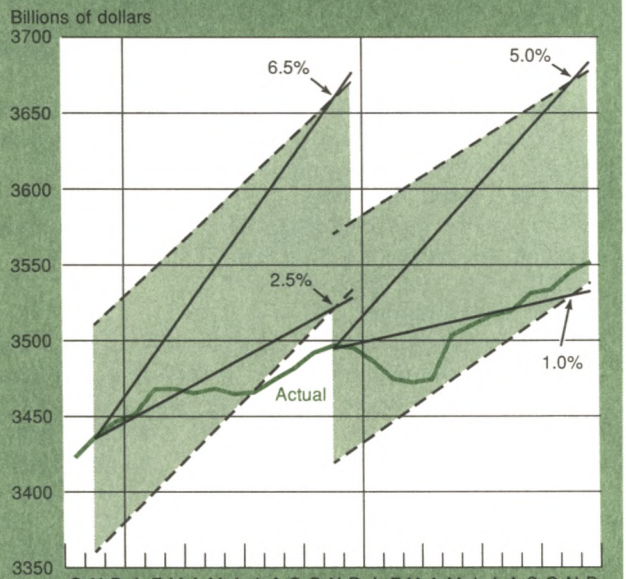


Chart 1C

M1: Levels and Growth Rates

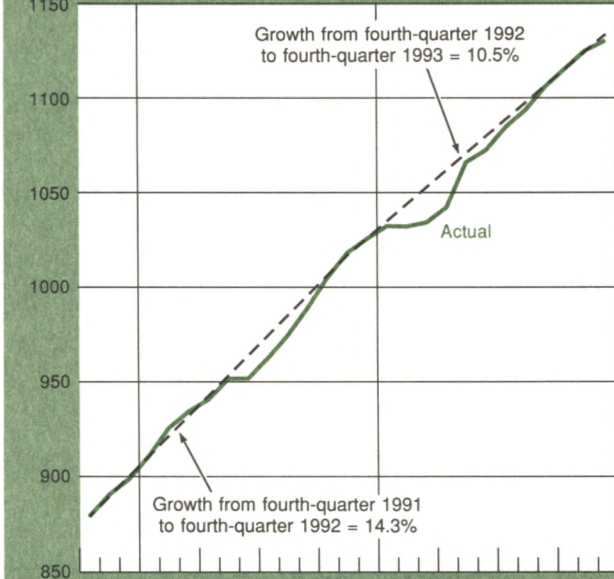


Chart 1B

M3: Levels and Target Ranges

Cones and Parallel Bands

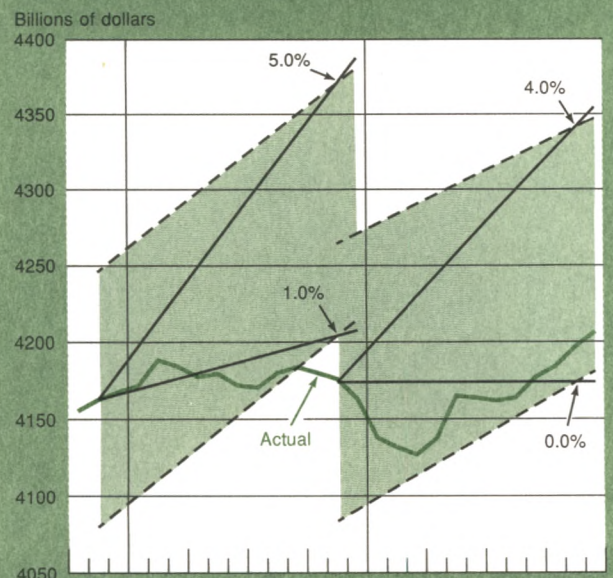
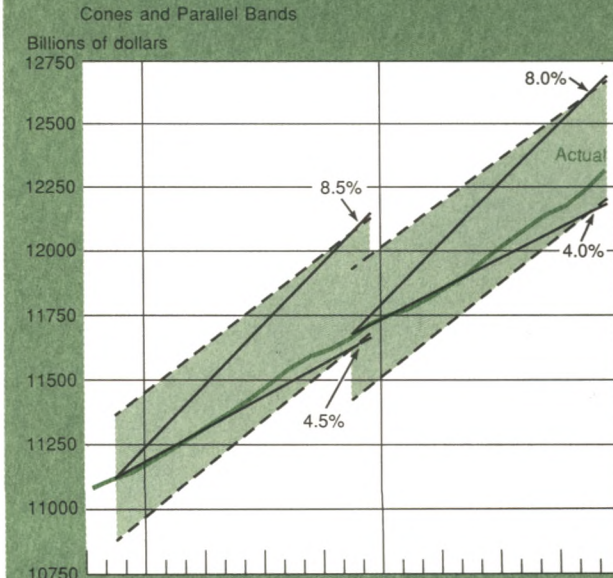


Chart 1D

Total Domestic Nonfinancial Debt: Levels and Monitoring Ranges

Cones and Parallel Bands



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basis points from where they stood at the start of 1993.[13]

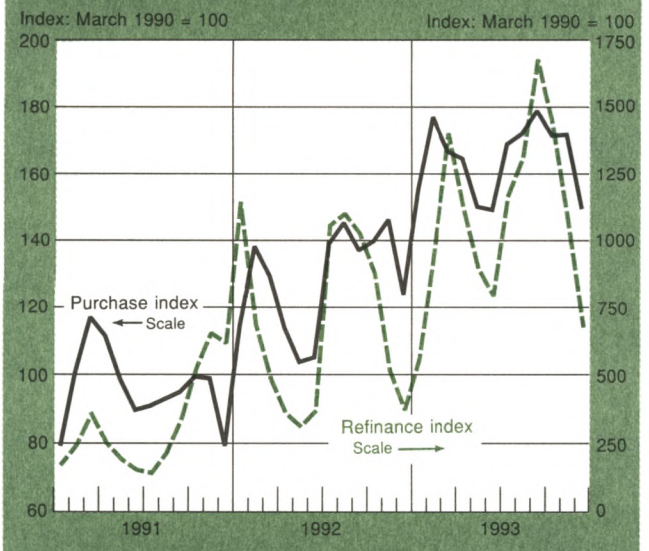
Several developments supported this market rally. Disinflationary trends in product and labor markets, together with perceptions that the underlying pace of economic expansion remained subdued, dampened inflationary expectations. Negotiation and passage of what was perceived as a credible package of fiscal restraint measures also played a part. In addition, some analysts felt that the Treasury's decision to reduce its reliance on longer term debt, a development discussed below, may have been a contributing factor. Declines in short-term interest rates were limited by the steady stance of monetary policy that effectively anchored these yields, so the yield curve flattened substantially (Chart 4).

[13] Between the end of 1992 and mid-October, the yield on the newest thirty-year bond fell more than 160 basis points, reaching 5.78 percent on October 15, the lowest yield since the Treasury began its regular issuance of thirty-year bonds in 1977.

Bond yields had been much lower before a legal prohibition of Treasury bonds with coupons above 4 1/4 percent forced the Treasury to discontinue bond issuance in the mid-1960s. For instance, in the 1940s, the Treasury sold a number of long-term bonds at yields of 2.50 percent. In the early to mid-1950s, yields set on the handful of long-term bonds sold were between 3 and 3.25 percent. Between 1958 and 1963, the Treasury sold long-term bonds at yields of 3.25 to 4.25 percent. The Treasury gained a partial exemption from the 4 1/4 percent ceiling in 1971. Bonds sold between that date and 1976—mostly with maturities of about twenty to twenty-five years—had yields ranging from about 6.8 to 8.6 percent.

Chart 2

Mortgage Application Indexes



Source: Mortgage Bankers Association of America.
Note: Purchase index is seasonally adjusted; refinance index is not seasonally adjusted.

Most interest rates rose abruptly early in the fourth quarter as evidence accumulated that an upsurge in economic activity was under way. Participants questioned whether the lower yields reached during the extended market rally were justified by economic fundamentals, and many investors took steps to protect accrued profits; these actions added upward momentum to the backup in rates. Yields then moved erratically over the final month or two of the year as investors reassessed economic and policy prospects.

Despite the partial turnabout late in the year, yields on intermediate- and long-term Treasury securities still fell some 80 to 100 basis points over the year as a whole.[14] The two- to thirty-year coupon yield curve flattened by about 75 basis points on balance, although it still remained relatively steep by historical standards.

Financial market conditions. Borrowers responded to lower interest rates by flooding the major credit markets with debt in 1993. Investment-grade corporate offerings jumped about 25 percent to a record $314 billion.[15] Below-investment-grade issuance climbed by more than 50 percent to $50 billion, surpassing even the highest yearly levels reached in the 1980s. Municipalities also sold an unprecedented amount of tax-exempt debt—$290 billion, or about 25 percent more than the preceding year's figure—with two-thirds of it intended to refinance outstanding issues. The defeasance-related purchases of Treasury securities generated by this refinancing activity were an important source of demand in the Treasury debt market at times during the year. Falling mortgage rates induced homeowners to refinance mortgages at an extraordinary pace. This prepayment activity, which came in several waves during the year, made mortgage-backed instruments less attractive to investors and reportedly led many investors to divert funds at least temporarily from the mortgage-backed market into longer dated Treasury issues.

The lower yield environment in 1993, combined with the continued forward momentum in the economy, helped improve the financial condition of many businesses, including depository institutions. Corporate profitability was up substantially, and corporate debt upgrades outnumbered downgrades for the first time in nearly a decade.[16] These positive developments were pronounced in the bank hold-

[14] At the end of 1993, the yield on the latest bond was 6.35 percent, compared with a rate of 7.39 percent on the most recent bond outstanding one year earlier. But as the section on Treasury finance notes, scarcity considerations may have exaggerated the implied decline in thirty-year yields.

[15] This total excludes all mortgage-backed, asset-backed, and convertible debt.

[16] According to Moody's Investor Service, upgrades in 1993 exceeded downgrades for the first time in nine years, by 163 to 154. According to Standard and Poor's, corporate upgrades exceeded downgrades for the first time since 1980, by 343 to 263.

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ing company sector. Many banks reported sharply higher profits in 1993, and ratings upgrades far exceeded downgrades.[17] Despite the improved financial health of many banks and their borrowers, depository lending showed few signs of revitalization.[18] Lending to consumers did pick up over the year, but borrowing by businesses remained flat. The continued restrained pace of lending by depositories reflected borrowers' changed attitudes toward debt, bankers' lingering caution, and the availability of alternative sources of business credit.

As a direct result of lower interest rates, the debt-servicing capabilities of consumers and businesses improved markedly in 1993, easing the financial burdens that had weighed on the economy in earlier years. Households began to take on new debt at a somewhat accelerated pace in the latter half of 1993, so their ratio of debt to income actually edged higher on balance over the year. In contrast, net business indebtedness was little changed as corporations continued to hold the line on new borrowing by defer-

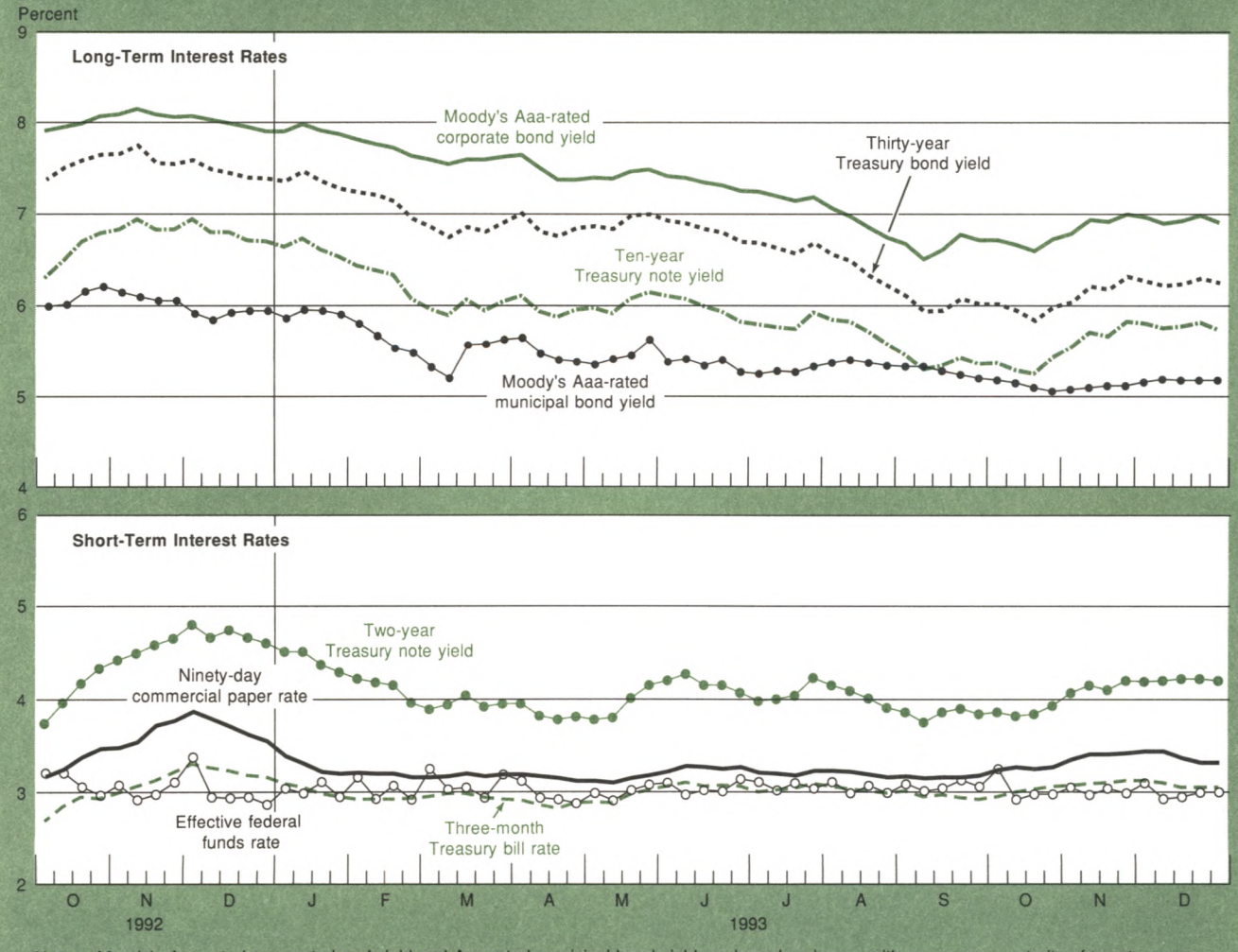
[17] Moody's upgraded 50 banks and downgraded only 4, while Standard and Poor's upgraded 36 banks and downgraded 5.

[18] Total depository lending rose about 2 3/4 percent on a fourth quarter–over–fourth quarter basis.

Chart 3

Long-Term and Short-Term Interest Rates

Weekly Averages



Notes: Moody's Aaa-rated corporate bond yield and Aaa-rated municipal bond yield are based on issues with an average maturity of twenty years. The discount rate was 3 percent over the interval.

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ring spending, financing a greater portion of purchases with improved cash flow, or issuing equity. For the economy as a whole, growth of private domestic nonfinancial debt accelerated moderately to about 3 3/4 percent in 1993.

Treasury finance. In May, the Treasury announced an important shift in the pattern of its borrowing. After a review of the issue, the Treasury concluded that it would reduce its real interest costs over time by modestly shortening the average maturity of its debt. The Treasury indicated that it would henceforth issue thirty-year debt semiannually, rather than quarterly, with bonds to be sold only in February and August.[19] Moreover, the quarterly issuance of seven-year notes was discontinued. The Treasury planned to offer more bills and coupon securities with maturities of three years or less to make up for reduced issuance of longer term debt.[20]

This modification of the Treasury's borrowing cycle influenced trading in the secondary market in 1993. In the view of some analysts, the decision to pare issuance of bonds may have contributed to the flattening of the yield curve. In addition, the change in the Treasury's financing pattern clearly affected the trading of specific issues. Most notably, the August 2023 bond, the last bond issued in 1993, traded at an unusually large premium relative to other long-term debt.[21] This issue was relatively scarce in the financing market soon after it was first issued, and it became much more so following the midquarter refunding auctions in November, the first to exclude a thirty-year bond under the Treasury's new financing regime.[22] Many market participants viewed the February 2023 bond as a better indicator of long-term debt yields than the August bond and continued to use it as the benchmark for comparing yields in other markets.

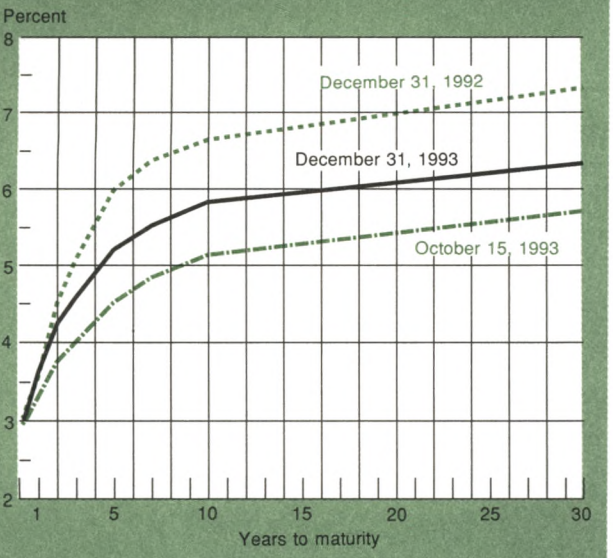
In other Treasury auction developments, the Treasury decided to extend for a second year, through August 1994, its experiment with a uniform-price auction format for its monthly two- and five-year note sales. In April, the Treasury began using the Treasury Automated Auction Processing System, an electronic bidding system. Since that time, most major market participants have been using the automated system routinely to bid at Treasury auctions. Further enhancements to the system are under way.

[19] Although the frequency of bond issuance was halved, the amount of bonds to be sold was cut somewhat less, about 40 percent.

[20] Partly reflecting this development, the average maturity of the Treasury's total outstanding debt slipped by two months in 1993 to end the year at sixty months (see Table A2 of the appendix).

Chart 4

Yield Curves for Selected U.S. Treasury Securities



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

The course of policy

The degree of reserve pressure was not changed in 1993, although the Committee responded to inflation worries by adopting directives biased toward tightening in May and July. During the rest of the year, directives were unbiased, or "symmetric," because inflation pressures were contained and the economy appeared to be on a path of sustained growth. In the latter part of the year, a firming move was considered the probable next step, but it was not thought to be imminent.

As the year began, evidence suggested that a moderate expansion was in progress and that inflation was still trending lower. Against this background, the Committee initially left reserve pressures unchanged and retained a symmetric directive with no presumption about the likely direction of any adjustment to policy over the intermeeting period (Table 3). During the first few months of the year, evidence accumulated that the expansion was slowing somewhat, while consumer and producer price indexes showed larger increases than those reported for most months of 1992. Nonetheless, continuing favorable trends in labor costs tempered concerns. Most Committee members felt that

[21] The spread in interest rates between this issue and the February 2023 bond, the previously issued bond, widened to 28 basis points at one point. At year-end, the yield on the older issue was 6.49 percent, 14 basis points above the rate on the newest issue.

[22] There were other notable instances when certain Treasury issues were scarce in the financing market. The February 2023 bond and 2003 ten-year note were very scarce until both issues were reopened at the May refunding. The August 2003 ten-year note was also very scarce until reopened in November. All three issues were close enough to par at the time they were reopened to make special tax considerations unnecessary.

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maintaining the existing degree of reserve pressure most appropriately balanced the opposing risks of faltering economic expansion and a resurgence of inflation.

During the second quarter, evidence of both a slowing expansion and a pickup in inflation continued to build. Although temporary anomalies, including distorted seasonal factors and measurement problems, helped explain the increases in various price measures, the Committee became concerned that inflationary expectations might be reemerging. At the May meeting, the majority of Committee members felt that recent developments warranted positioning policy for a move toward restraint if signs of intensifying inflation continued to multiply. Consequently, the Committee adopted an "asymmetric" directive with a bias toward tightening. In view of the special nature of the inflation concerns and the attendant uncertainties, it decided that an intermeeting discussion would be appropriate before making a tightening move.

Table 3
Specifications from Directives of the Federal Open Market Committee and Related Information

Date of Meeting	Anticipated Short-Term Growth of M2 and M3	Discount Rate (Percent)	Borrowing Assumption for Deriving Nonborrowed Reserve Path (Millions of Dollars)	Associated Federal Funds Rate† (Percent)	Effect on Degree of Reserve Pressure	Guidelines for Modifying Reserve Pressure between Meetings‡
12/22/92	M2 growth of 1½ percent and M3 about unchanged from November through March	3	50	3	Maintain	Slightly greater reserve restraint or slightly lesser reserve restraint *would* be acceptable.
2/2 to 2/3/93	Little change from January to March	3	50	3	Maintain	Slightly greater reserve restraint or slightly lesser reserve restraint *would* be acceptable.
3/23/93	Moderate growth over the second quarter	3	50 75 on 4/22§ 100 on 5/13§	3	Maintain	Slightly greater reserve restraint or slightly lesser reserve restraint *would* be acceptable.
5/18/93	Appreciable growth over the second quarter	3	100 125 on 5/20§ 150 on 6/10§ 200 on 6/24§	3	Maintain	Slightly greater reserve restraint *would* be acceptable or slightly lesser reserve restraint *might* be acceptable.
7/6 to 7/7/93	Modest growth over the third quarter	3	200 225 on 7/8§ 250 on 7/22§	3	Maintain	Slightly greater reserve restraint *would* be acceptable or slightly lesser reserve restraint *might* be acceptable.
8/17/93	Modest growth in M2 and little net change in M3 over the balance of the third quarter	3	250	3	Maintain	Slightly greater reserve restraint or slightly lesser reserve restraint *might* be acceptable.
9/21/93	Modest growth over the balance of the year	3	250 225 on 10/14§ 200 on 10/28§ 150 on 11/4§ 100 on 11/11§	3	Maintain	Slightly greater reserve restraint or slightly lesser reserve restraint *might* be acceptable.
11/16/93	Modest growth over coming months	3	100 75 on 11/26§ 50 on 12/9§	3	Maintain	Slightly greater reserve restraint or slightly lesser reserve restraint *might* be acceptable.
12/21/93	Moderate growth over coming months	3	50	3	Maintain	Slightly greater reserve restraint or slightly lesser reserve restraint *might* be acceptable.

† The federal funds rate trading area that is expected to be consistent with the borrowing assumption.
‡ Modifications to reserve pressures are evaluated "in the context of the Committee's long-run objectives for price stability and sustainable economic growth, and giving careful consideration to economic, financial, and monetary developments."
§ Change in borrowing assumption reflects technical adjustment to account for actual or prospective behavior of seasonal borrowing.

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Inflation reports for May, released near midyear, were more encouraging, although the impression remained that progress toward price stability had been at least interrupted. Consequently, at the July meeting, the Committee retained the bias toward tightening adopted at the previous meeting because the next move was more likely to be in that direction. Moreover, a return to symmetry could have been misinterpreted in these circumstances as an indication of worries about the sustainability of the expansion or as a wavering in the commitment to fight inflation. Chairman Greenspan, in his semiannual Humphrey-Hawkins testimony before Congress later in July, characterized current monetary policy as accommodative, especially when judged by the low level of real short-term interest rates. But he indicated that this posture, while appropriate in recent years in helping the economy overcome its "headwinds," would need to change as the recovery progressed.

Later in the summer, a combination of influences, including the relatively slow rate of expansion in the first half of the year, the impression that the deficit-reduction legislation would continue to restrain the economy, and the release of more favorable inflation data, weakened the case for a near-term policy adjustment. While the FOMC continued to view a firming move as the likely next step, it no longer considered such a move probable in the near term. The Committee's position was reflected in its return to an unbiased directive at the August meeting. Over the remainder of the third quarter, the economy appeared to be expanding at a moderate pace, price developments remained favorable, and the Committee left reserve pressures unchanged.

During the final months of the year, evidence mounted that the pace of economic expansion was accelerating. Numerous reports indicated robust economic growth during the fourth quarter. Nevertheless, a return to more moderate growth seemed likely in early 1994 and beyond as taxpayers began to adjust to retroactive tax law changes and as economic weakness continued abroad.

In the discussion at the December meeting, the Committee again recognized the likelihood that containing inflation and providing a sound basis for sustained economic expansion would at some point require a shift in policy from an accommodative stance to a more neutral stance. Although it was felt that such a move might have to be made sooner rather than later, sufficient slack remained in the economy and enough uncertainties surrounded the outlook to make existing policy acceptable. Furthermore, since any tightening would represent a turn in policy following a long period of declining and steady interest rates, Committee members were concerned that it might have a greater than usual effect on financial markets. This prospect argued for implementing a change at a meeting, where there would be a full Committee review, rather than acting on an asymmetric directive between meetings. Consequently, the FOMC voted to maintain its symmetric posture.

Implementation of policy

Operating procedures

Borrowed reserves and the federal funds rate. In 1993, the FOMC continued to frame its formal policy objectives in terms of the desired degree of reserve pressure, specifying an assumed amount of adjustment plus seasonal borrowing from the discount window. (These anticipated levels of borrowing and other reserve measures for 1993 are presented in Table 4.) A stable relationship between the level of borrowing and the spread of the federal funds rate over the discount rate would lead the borrowing allowance to be associated with federal funds trading within a limited band surrounding an expected level. For a number of years, however, the demand for borrowed reserves had not been sufficiently dependable to serve as a primary guide to reserve pressures. Consequently, the Desk, in its day-to-day implementation of policy, used staff estimates of the demand for and supply of reserves, along with the behavior of the federal funds rate, as guides to determining the reserves needed to achieve the desired degree of reserve pressure.

A series of developments beginning around the middle of the 1980s made the relationship between borrowing and the federal funds rate less reliable. As earlier issues of this report explained in detail, increases in financial stress in the banking system sometimes led the public to interpret a bank's use of the discount window as a sign that it was experiencing difficulties.[23] Banks responded by making extraordinary efforts to avoid borrowing at the discount window. They often bid the interbank federal funds rate to very high levels when reserves were scarce.[24] In the last two years, this unusual reluctance of banks to borrow eased somewhat, in part because of the improved financial condition of U.S. banking institutions. Accordingly, on those occasions in 1993 when reserves were scarce relative to bank demands, the spikes in the federal funds rate required to encourage the necessary increase in borrowing were somewhat more modest than they had been a few years earlier.

Nonetheless, other factors continued to keep routine borrowing at relatively low levels. Banks had less need to borrow in 1993: On most days, reserve levels were sufficient to keep the federal funds rate very close to the 3 percent dis-

[23] See especially the reports on monetary policy and open market operations in the spring 1991 and spring 1992 issues of the Federal Reserve Bank of New York *Quarterly Review.*

[24] If aggregate reserve levels are insufficient to meet the demand for reserves, eventually some banks have to borrow because the banking system as a whole cannot create reserves in other ways. For more information, see Ann-Marie Meulendyke, *U.S. Monetary Policy and Financial Markets,* Federal Reserve Bank of New York, 1990, chap. 6, pp. 124-39.

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count rate, whereas for several years before September 1992 the funds rate routinely exceeded the discount rate.[25] In addition, plentiful deposit funds in a period of continuing low loan demand kept many banks very liquid during the year. Furthermore, improved monitoring of reserve balances by banks continued to reduce the risk that a bank would discover that it had a reserve shortage only after the federal funds wire closed, when the discount window would be the only remaining source of reserves.

These factors combined to make adjustment borrowing in 1993 very low on most days. It averaged only $72 million for the year, slightly below the 1992 level. Total reserves averaged $57.8 billion over the year, making adjustment borrowing a very small fraction of reserves. The "frictional" levels of adjustment borrowing—a range typically experienced when banks had no interest rate incentive to borrow and large banks had no unusual internal or wire problems—seemed to be in the range of $10 million to $20 million, somewhat lower than during 1992. Some exceptionally low levels of adjustment borrowing occurred during the year. In the period ended November 24, adjustment borrowing averaged only $6 million, its lowest level since two-week maintenance periods were introduced in 1984 (and the lowest level since the $5 million average for the one-week maintenance period ended April 9, 1975). For the week ended December 8, adjustment borrowing averaged $1 million, a record low for any post-World War II week.[26] (Actual levels of borrowing and the effective federal funds and discount rates are presented in Chart 5.)

The pattern and level of seasonal borrowing are related primarily to changing demands for agricultural credit rather than to the degree of reserve pressure. The change in early 1992 from the basic discount rate to a market-based rate

[25] The effective federal funds rate averaged 3.02 percent for the year.

[26] Borrowing also averaged $1 million in the week ended January 13, 1943.

Table 4
1993 Reserve Levels
Millions of Dollars

Period Ended	Required Reserves (Current)	Required Reserves (First Published)	Excess Reserves (Current)	Excess Reserves (First Published)	Total Reserves	Adjustment and Seasonal Borrowing	Nonborrowed Reserves plus Extended Credit Borrowing (Current)	Nonborrowed Reserves plus Extended Credit Borrowing (First Published)	Nonborrowed Reserves Interim Objective	Initial Anticipated Adjustment and Seasonal Borrowing	Final Anticipated Adjustment and Seasonal Borrowing	Assumed Excess Reserves	Extended Credit Borrowing
1993													
Jan. 6	56289	56253	1385	1437	57674	269	57405	57422	57254	50	50	1000	0
20	55657	55675	1229	1188	56886	202	56685	56662	56704	50	50	1000	1
Feb. 3	52740	52749	1230	1250	53970	62	53906	53938	53752	50	50	1000	3
17	52875	52895	1495	1585	54370	33	54337	54447	53956	50	50	1000	0
Mar. 3	52666	52546	571	748	53237	56	53181	53238	53451	50	50	1000	0
17	53683	53656	1290	1334	54973	93	54880	54896	54594	50	50	1000	0
31	52572	52630	1273	1280	53845	98	53747	53811	53600	50	50	1000	0
Apr. 14	55763	55789	844	832	56607	38	56569	56584	56761	50	50	1000	0
28	55160	55147	1387	1386	56546	99	56447	56435	56111	50	75	1000	1
May 12	55217	55203	828	919	56044	142	55902	55981	56133	75	75	1000	1
26	54649	54659	1202	1181	55851	105	55746	55736	55596	100	125	1000	0
June 9	56109	56098	824	911	56933	118	56815	56890	56985	125	125	1000	0
23	56477	56467	772	791	57248	158	57091	57100	57241	150	150	1000	0
July 7	56311	56497	1299	1244	57610	311	57300	57430	57159	200	200	1000	0
21	57294	57219	967	1040	58260	220	58041	58039	57998	225	225	1000	0
Aug. 4	56021	56022	1112	1115	57133	232	56902	56906	56729	250	250	1000	0
18	57673	57741	750	712	58422	431	57992	58023	58420	250	250	1000	0
Sept. 1	56136	56181	1121	1080	57257	305	56952	56956	56945	250	250	1000	0
15	58845	58827	874	878	59718	544	59175	59162	59579	250	250	1000	0
29	57318	57362	1300	1344	58618	322	58297	58386	58101	250	250	1000	0
Oct. 13	58985	59053	1137	1089	60121	420	59702	59723	59900	250	250	1000	0
27	58692	58705	1052	1061	59744	205	59539	59563	59510	225	225	1000	0
Nov. 10	59722	59754	1062	1031	60783	132	60652	60654	60610	200	150	1000	0
24	60205	60215	1102	1027	61307	74	61233	61169	61102	100	100	1000	0
Dec. 8	60962	60902	1162	1211	62123	56	62068	62057	61838	75	75	1000	0
22	61880	61928	891	838	62771	60	62712	62706	62815	50	50	1000	0
1994													
Jan. 5	62405	62403	1241	1301	63646	142	63505	63563	63401	50	50	1000	0

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that is not permitted to fall below the basic discount rate has reduced the incentive for banks to use seasonal credit from the discount window to meet the enlarged loan demand during the crop-growing season. In most maintenance periods in 1993, seasonal borrowing remained close to its 1992 levels (Chart 5). An exception occurred in October, when seasonal borrowing fell more slowly than at this time in earlier years; severe summer floods in the Midwest delayed crop planting and harvesting and consequently pushed some needs for seasonal credit further into the autumn.

For the year, seasonal borrowing averaged $109 million, compared with $97 million in 1992. It peaked at $246 million in the periods ended September 1 and 29, and it reached its lowest average level of $10 million in the periods ended January 20 and February 3. To keep pace with the movements in seasonal borrowing, the Desk made seven upward technical adjustments to the borrowing allowance between April and July, and afterwards made six technical reductions to the allowance.

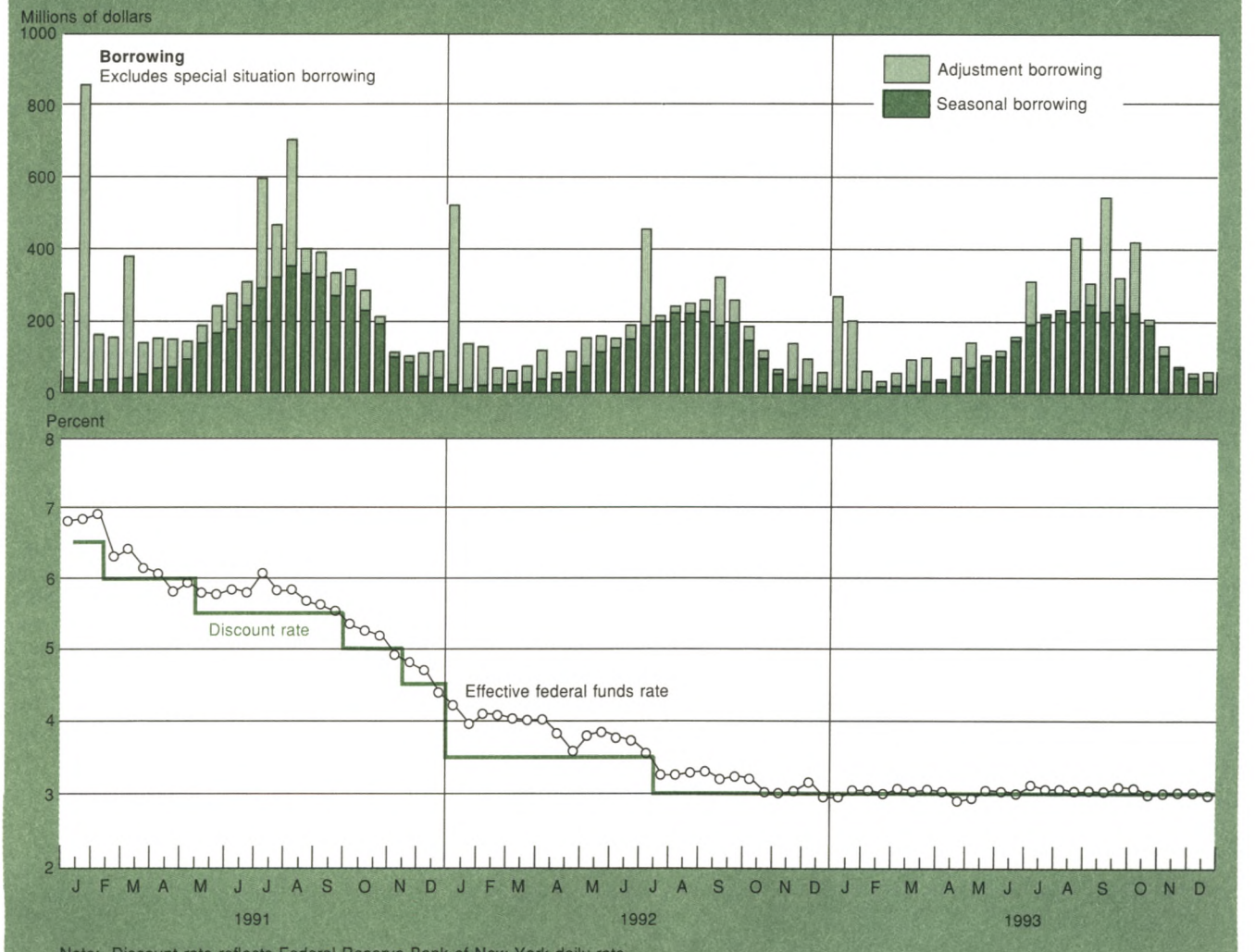
The Desk's approach to reserve management

During the year, the Desk often faced sizable reserve needs, which it addressed with a mix of outright and tempo-

Chart 5

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

Maintenance Period Averages



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

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rary transactions. Outright market purchases were made when staff forecasts suggested that a large need for reserves would persist for several maintenance periods. Temporary transactions addressed remaining reserve needs and were used to deal with shorter term variability and uncertainty about the reserve picture.

Outright operations. The System's portfolio of U.S. government securities expanded by a record $35.3 billion in 1993 (on a commitment basis), primarily because of the rapid growth in currency and required reserves against transactions deposits described above.[27] Other operating factors combined to add a modest amount of reserves.[28] As is typical, the Desk's outright purchases were concentrated in the market, although the Desk also purchased a sizable amount of securities from foreign accounts. No securities were sold in 1993, although $1.7 billion of securities were redeemed.[29]

In 1992, following a review of the System's portfolio management strategy, the Committee had concluded that the desired increase in the liquidity of the System's holdings had been achieved.[30] Consequently, the Desk's outright operations during 1993 were designed to maintain or lengthen slightly the portfolio's average maturity. About half of the increase in the portfolio over the year reflected purchases of Treasury coupon issues, and the weighted average maturity of the Federal Reserve's holdings of marketable Treasury debt rose roughly two months.

Temporary operations. Because reserve needs were growing over most of the year and were usually permitted to run ahead of the outright purchases, most temporary transactions consisted of RPs. The Desk arranged $510.5 billion of RPs over the year in operations for the System Account and another $117.1 billion in customer-related operations. The Desk relied to a greater degree than in many past years on multiday System operations. Operations to drain reserves were rare, with only $10.9 billion of matched sale-purchase agreements arranged in five market entries during the year.

Managing reserves within a maintenance period. For each two-week reserve maintenance period, the Trading Desk developed a strategy to bring the estimated supply of nonborrowed reserves into line with the estimated demand for reserves in order to achieve the desired degree of reserve pressure. Recognizing banks' general desire to smooth reserve holdings within the period, the Desk also gave some attention to day-to-day reserve excesses or shortages. Moreover, it took into account bank strategies for managing reserves and allowed for potential revisions to operating factors and required reserves as the period progressed.

In meeting the estimated reserve need, the Desk looked to conditions in the money market for confirmation of its reserve estimates. On many occasions, the money market reflected the size of the reserve need or surplus, with tight conditions accompanying a large need and softness a surplus. On some occasions, however, discrepancies arose between reserve estimates and conditions in the federal funds market. These differences usually stemmed from the reserve management strategies of depositories, as explained below, or from incorrect estimates of the reserve need on the part of the Desk or bank reserve managers.

In earlier years, market expectations of an imminent change in policy had also influenced reserve demands. But because expectations of such a change were largely absent in 1993, the Desk was better able to deal with discrepancies between the federal funds rate and estimated reserve needs. With an easing move regarded as unlikely, market participants were less inclined than in earlier years to interpret a soft funds rate as a potential sign of easing. When the funds rate was slightly to the soft side, the Desk was able to refrain from draining reserves and even to add reserves on a number of occasions.[31]

Strategies used by depository institutions to meet reserve requirements on a two-week average basis and to avoid overnight overdrafts in their accounts at the Federal Reserve often contributed to discrepancies between reserve estimates and conditions in the money market in 1993. Depository institutions continued to use techniques similar to those adopted following the cuts in reserve requirements in 1990 and 1992, despite what appeared to be a reduced need for them.[32] By lowering required reserve balances at the Fed, the cuts had increased the risk that a depository institution, while working off excess reserves accumulated early in a period, would run an overnight overdraft.[33] To minimize that risk, depositories often concen-

[27] Details of outright and temporary transactions in 1993 are presented in the appendix.

[28] Specifically, growth in the demand for currency in circulation drained almost $32 billion of reserves during 1993. All other operating factors combined to add about $1 billion of reserves. Required reserves rose about $6 billion for the year.

[29] The Desk redeemed securities only when there were no suitable replacement securities for a maturing Treasury or agency issue or when issues were called.

[30] The review had been prompted in part by the Treasury's discussion during 1992 of the merits of shortening the average maturity of its debt. Both Treasury debt management and the composition of the System portfolio were discussed in "Monetary Policy and Open Market Operations during 1992," Federal Reserve Bank of New York *Quarterly Review,* Spring 1992.

[31] For example, in the maintenance period ended January 20, the Desk arranged three customer-related RPs with the funds rate at 2 15/16 percent. On May 20, the Desk arranged a four-day RP with the funds rate again at this level.

[32] The effects of the reserve requirement cuts on reserve management practices were discussed in detail in the 1990, 1991, and 1992 reports.

[33] Overnight overdrafts are costly because the Fed imposes a steep penalty charge. The cost of holding excess reserves is the loss of interest that could have been earned if the reserves had been invested.

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trated more of their reserve holdings late in the period.

By 1993, reserve balances had risen considerably above the levels that prevailed shortly after the cuts in reserve requirements. Two developments in 1991 and 1992 contributed to this rise: rapid growth in transactions deposits raised required reserves, and large banks opened and expanded required clearing balances.[34] In 1993, strong expansion in transactions deposits continued to lift required reserves. By December, required operating balances—a measure consisting of required clearing balances and the portion of required reserves that must be met with reserve balances—averaged about $34 billion, a level similar to the one prevailing in December 1990, when reserve requirement ratios had not yet been reduced (Chart 6).

The growth in required operating balances would suggest that the pressures leading banks to avoid a buildup in reserve levels early in the period should have dissipated somewhat. Yet in 1993, depositories continued to concentrate their demand for reserves late in the period.[35] One reason for the persistence of this behavior was that the volume of daily transactions between banks has risen somewhat since 1990, increasing the need for reserve balances for processing daily transactions. Because depositories remained reluctant to accumulate reserves early in the period, reserve needs often failed to show through to the federal funds market until after the second weekend. To some degree, the Desk accommodated this intra-maintenance-period pattern in the banking system's demand for reserves by keeping cumulative excess reserves low during the early part of the period.

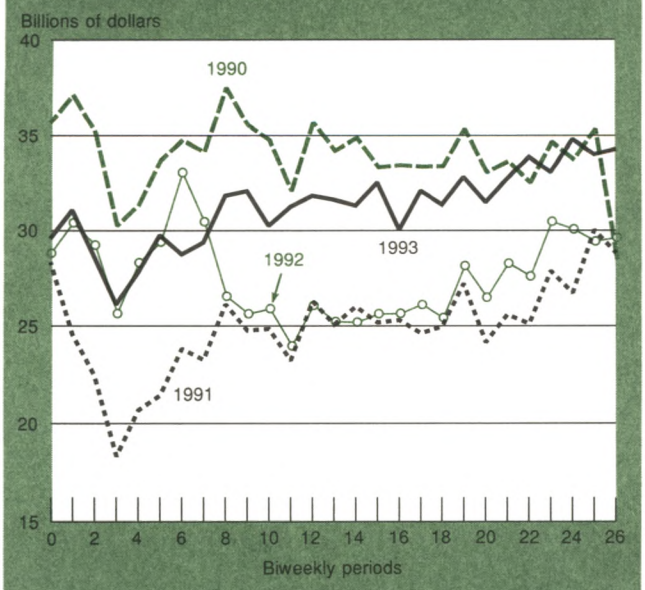
The federal funds market was especially likely to be soft on Fridays, even when reserve needs were substantial, because banks were cautious about holding excess reserves over the weekend, when they would count for three days. If the Desk arranged its standard type of multiday RP on Thursday, permitting the dealers to withdraw their collateral each morning during the period of the RP, it would often face heavy early withdrawals when the funds rate softened on Friday. The RP rate usually moved with the funds rate, and lower RP rates gave the dealers an incentive to withdraw their collateral and to finance it elsewhere. The Desk could not easily replace all of the reserves withdrawn on Friday if the funds rate were below the level associated with the desired degree of reserve pressure, although a small reserve injection was sometimes feasible.

The Desk often found it advantageous during 1993 to prevent early withdrawals by making use of fixed-term multiday RPs. It arranged thirty-one such operations during the year, a significant increase from the nine fixed-term multiday RPs that had been arranged in 1992. Of those arranged in 1993, twenty-three extended over a weekend.[36] When fixed-term RPs were put in place on a Thursday to span the weekend, the Desk no longer had to worry that the RPs would be withdrawn, diminishing reserve supplies on Friday.[37]

[34] A depository can establish a clearing balance by specifying an average level of reserves that it will hold at the Federal Reserve for clearing purposes. In exchange, it receives credits that it can use to pay for priced services provided by the Federal Reserve at a rate determined by the effective funds rate. At the end of 1992, total required clearing balances had reached $5.9 billion, an increase from $1.8 billion in December 1990. The level of clearing balances rose only slightly during 1993, ending the year at $6.3 billion.

Chart 6

Required Operating Balances



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

[35] As explained in the 1992 report, the distribution of excess reserves within the maintenance period was reasonably uniform until December 1990. Thereafter, the distribution became decidedly skewed toward the second week of the maintenance period. After the second round of reserve requirement cuts in April 1992, the average levels in the first and second weeks of periods from that month through December 1992 were $280 million and $1,740 million, respectively. During 1993, the corresponding averages were $170 million and $1,980 million.

[36] For example, in the maintenance period ended July 21, the Desk arranged three fixed-term multiday RPs. Two were arranged on Thursdays and extended over the two weekends of the period. The funds market did in fact display its characteristic softness on both Fridays, suggesting that dealers would likely have withdrawn collateral early if the option had been available.

[37] The pricing of fixed-term RPs appeared to incorporate the expected course of overnight RP rates over the full term of the contract.

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The Desk also remained alert in 1993 to the possibility that an inconsistency between reserve estimates and the funds rate could reflect an error in the estimates of the demand for or the supply of reserves. Forecasts of the demand for reserves are based on estimates of required reserves and the projected demand for excess reserves. Projections of the supply of reserves depend upon forecasts of the various operating factors. At times in 1993, revisions were large.[38] When a large error seemed especially likely—for example, around tax dates, when the Treasury's deposits at the Federal Reserve were particularly uncertain, or when bad weather made Federal Reserve float difficult to forecast—the Desk allowed itself to be guided to an increased extent by conditions in the funds market.

[38] The appendix reviews the accuracy of the available forecasts for reserve supply and demand.

Appendix: Desk Activity for the System Open Market Account

The appendix reviews the Trading Desk's activities on behalf of the System Open Market Account during 1993. The first section details outright changes in the portfolio and the reasons for these changes. Temporary transactions arranged during the year are discussed in the second section, and the accuracy of staff estimates of the supply of and demand for reserves is examined in the third.

Outright changes in the System portfolio

Total System holdings of U.S. government securities expanded by a record $35.3 billion during 1993, an increase exceeding the $30.2 billion rise in 1992 and the previous record increase of $31.0 billion in 1991 (Table A1). At the end of the year, the total par value of the System's holdings was just above $344 billion. The System's holdings made up a slightly larger share of the Treasury's total marketable debt at year-end than they had at the previous three year-ends. About half of the increase in the System portfolio occurred in bills and about half in coupons, with the five-to-ten-year sector experiencing the strongest rate of growth. As a consequence, the weighted average maturity of the System's holdings was lengthened by about two months (Table A2).

Bank reserve behavior

The expansion of the portfolio was prompted primarily by changes in operating factors, which drained almost $30 billion of reserves between the maintenance periods ended January 6, 1993, and January 5, 1994 (Table A3). Currency growth of $31.5 billion accounted for more than the full amount of the reserve drain from factors. Rapid growth in transactions deposits also led to a $6.1 billion expansion of required reserves during the year. Average excess reserves were $1,080 million for the year, modestly above the $1 billion formal allowance but close to the previous year's average level.

A few other operating factors also influenced reserves over the year. Reflecting the general downtrend in interest rates in recent years, net premia on the securities purchased outright in the market over the year increased and added $2.5 billion to the level of reserves. Required clearing balances, which are included as a drain on reserves in the "other items" category when they expand, rose by only $430 million in 1993 after jumping sharply in the previous year. The net reserve impact of all foreign currency operations in 1993 added a modest $0.8 billion.† Several other factors, including the Treasury balance, had sizable impacts on reserves in individual maintenance periods but had no effect on the trends.

Adjustment borrowing at the end of 1993 was well below the elevated level of the previous year-end, while seasonal borrowing was little changed. Very little extended credit or special situation borrowing occurred during the year.

Table A1

System Portfolio: Summary of Holdings

Billions of Dollars

	Year-End 1993	Change during 1993	Change during 1992
Total holdings:	344.1	35.3	30.2
Bills	167.9	17.7	11.5
Coupons	171.6	18.4	19.4
Agency issues	4.5	–0.9	–0.6

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

Outright transactions

The Trading Desk conducted outright operations at those times when reserve projections showed a large, persistent need to add reserves. The overall volume of outright operations in 1993 was slightly higher than in 1992 as increased purchases more than offset decreased sales. Purchases of Treasury bills were about $3 billion above the previous year's total, and there were no outright sales of securities during 1993 (Table A4). On four of the six occasions when the Desk entered the market to conduct outright purchases,

† Interest earnings on foreign currency assets added a bit more than $1.25 billion over the year, and currency revaluations added another $0.25 billion. Sales of Japanese yen through five rounds of intervention drained just over $0.7 billion of reserves.

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it purchased Treasury coupon securities.‡ In 1992, three of the six outright market operations had been purchases of coupon securities, while in 1991, only one such operation involved coupon securities. The Desk had to redeem about $800 million of coupon securities on two occasions in 1993 when the Treasury did not sell replacement issues for maturing seven-year notes. It did not deliberately redeem securities to drain reserves during the year, because reserve forecasts never called for an extended period of absorption.

The Desk also arranged transactions with foreign accounts when orders were compatible with estimated reserve needs. With fewer purchases and no sales in 1993, the volume of these transactions was down $2.3 billion from 1992. More than three-quarters of the transactions with foreign accounts in 1993 (about $9 billion) were bill purchases, although the Desk also purchased $2.4 billion of coupon securities from this source.

The Desk managed its holdings of federally sponsored agency securities by rolling over maturing issues into replacements or by redeeming securities when suitable replacements were not offered for maturing issues or when issues were called. In particular, during 1993, the Desk redeemed almost all of its maturing Federal Home Loan Bank issues.§ In all, about $0.9 billion of the $2.1 billion of maturing agency issues were redeemed, and the amount of these securities in the System portfolio declined for the thirteenth year in a row.

‡ The Desk bought, in par values, $3.1 billion of Treasury coupon securities on March 16, $5.0 billion of coupons on April 14, $5.1 billion of Treasury bills on June 2, $4.0 billion of coupons on August 31, $3.5 billion of bills on November 3, and $4.6 billion of coupons on November 30.

§ The Desk can roll over a maturing security into a new agency issue if the new issue satisfies criteria relating to both size and security-type and has an issue date matching the maturity date of the old security. In 1993, most new Federal Home Loan Bank debt had issue dates that did not match the maturity dates of the old securities.

Table A2

Weighted Average Maturity of Marketable Treasury Debt

Months

End of	Federal Reserve Holdings†	Total Outstanding
1960	19.3	55
1965	16.1	60
1970	23.9	40
1975	31.2	33
1980	53.7	48
1985	47.3	59
1986	43.7	62
1987	42.6	66
1988	40.5	67
1989	41.2	69
1990	38.7	68
1991	35.3	68
1992	36.2	67
1993	38.0	65

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

Temporary transactions

The Desk arranged self-reversing transactions in the market during the year to meet temporary reserve needs. Although

Table A3

Reserve Measures and Factors Affecting Reserves

Bank Reserves

Millions of Dollars, Not Seasonally Adjusted

	Maintenance Period Ended January 5, 1994	Change during: 1993†	1992‡
Nonborrowed reserves			
Excluding extended credit	63505	6100	768
Including extended credit	63505	6100	767
Extended credit borrowing	0	0	–1
Borrowed reserves			
Including extended credit	142	–127	–253
Adjustment plus seasonal	142	–127	–252
Adjustment	126	–131	–242
Seasonal	16	4	–10
Required reserves§	62405	6116	269
Excess reserves	1241	–144	247

System Portfolio and Operating Factors¶

Billions of Dollars

System portfolio	353.8	36.2	29.9
Operating factors:			
Foreign currency††	19.5	0.7	–3.2
U.S. currency	365.8	–31.5	–27.1
Treasury balance	8.5	–1.1	2.2
Float	1.3	–1.2	1.7
Special drawing rights	8.0	0.0	–2.0
Gold deposits	11.1	0.0	0.0
Foreign deposits	0.3	0.1	–0.3
Applied vault cash	33.3	0.0	0.0
Other items	18.7	1.3	–1.4
Foreign repurchase agreement pool‡‡	7.7	–0.2	–0.6

Note: Figures may not add to totals because of rounding.

† Change from maintenance period ended January 6, 1993, to that ended January 5, 1994.

‡ Change from maintenance period ended January 8, 1992, to that ended January 6, 1993.

§ Not adjusted for changes in required reserve ratios.

¶ Sign indicates impact of changes in operating factors on bank reserves. All items are biweekly averages.

†† Acquisition value plus interest earnings. Revaluation of foreign currency holdings are included in "other items."

‡‡ Includes customer-related repurchase agreements.

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the total number of temporary transactions was almost unchanged from a year earlier, the Desk continued its recent trend toward increased use of multiday System RPs during 1993, arranging considerably more of these transactions than it had in 1992 (Table A5).[¶] It also arranged about the same number of overnight System RPs as in 1992 and continued to reduce its use of customer-related RPs.

The number and dollar volume of matched sale-purchase transactions arranged in the market in 1993 fell sharply from earlier years. The Desk arranged only five rounds of reserve-draining operations during the year, two of them for maturities exceeding one business day. In contrast, the Desk arranged a total of twenty such draining operations in 1992. Reserve drains early in 1993 were much smaller than in 1992 because of stronger currency growth and a smaller seasonal decline in required reserves.

The Desk typically announced any intention to add or drain reserves with a temporary operation at about 11:30 a.m. However, on several occasions during the year, the Desk announced its intended reserve operation earlier than usual to encourage adequate propositions.[††]

[¶] The number of multiday System RPs arranged in 1992 had also represented a large increase from the total arranged in 1991. Although the number of multiday RPs grew considerably in 1993, the average transaction size fell somewhat during the year.

Table A4

System Outright Operations by Type of Transaction and by Counterparty

Billions of Dollars

	1993	1992
Total outright	38.6	37.9
By type of transaction:		
Purchases	36.9	34.1
Bills	17.7	14.7
Coupons	19.2	19.4
Sales	0.0	1.6
Bills	0.0	1.6
Coupons	0.0	0.0
Redemptions	1.7	2.2
Bills	0.0	1.6
Coupons	0.8	0.0
Agency issues	0.9	0.6
By counterparty:		
Total outright in market	25.4	21.9
Purchases	25.4	21.9
Bills	8.6	9.7
Coupons	16.8	12.3
Sales	0.0	0.0
Bills	0.0	0.0
Coupons	0.0	0.0
Agency issues	0.0	0.0
Total outright with foreign accounts	11.5	13.8
Purchases	11.5	12.2
Bills	9.1	5.1
Coupons	2.4	7.1
Sales	0.0	1.6
Bills	0.0	1.6
Coupons	0.0	0.0

Note: Values are on a commitment basis.

Forecasting reserves and operating factors

In meeting reserve needs during the year, the Desk took into account potential revisions to the demand for and supply of reserves. Large revisions to projections can complicate reserve management, especially late in a maintenance period. During 1993, the accuracy of staff forecasts of required reserves and excess reserves improved modestly relative to 1992 and revisions to beginning-of-period net operating factor estimates declined substantially. Forecasts of some individual operating factors deteriorated, however (Table A6).

On the demand side, the forecast errors for required reserves were smaller at each stage of the maintenance period in 1993 than they had been in 1992, an improvement that stemmed in part from unchanged reserve requirement ratios during the year. The model-based projections for excess reserves also improved somewhat, and actual excess reserves were less volatile than the year before.[‡‡] The formal allowance remained at $1 billion for each maintenance period during the year, although the Desk often made informal allowances that either exceeded or fell short of this amount.[§§]

On balance, the beginning-of-period forecasts for net operating factors were better than in 1992, but the forecast accuracy fell off somewhat from the previous year in the middle of maintenance periods. The accuracy of forecasts on the final day was about unchanged from the previous year.

As in past years, the forecasts of the Treasury's Fed balance showed the largest errors, especially following major

[††] Twice during the year, on June 24 and on December 23, it arranged RPs that had been announced the afternoon before. In both cases, reserve needs for the maintenance period were particularly large. On two other occasions, September 30 and December 31, the Desk announced RP operations earlier in the day than usual.

[‡‡] While one would have expected the increase in the average absolute level of carry-ins at large banks from $107 million in 1992 to $158 million in 1993 to contribute to greater excess reserve volatility, the average absolute period-to-period change in excess reserves actually fell from $366 million in 1992 to $300 million in 1993. The discrepancy may in part reflect the greater frequency with which large money center banks wasted positive carry-ins in 1993.

[§§] Forecast errors for excess reserves are calculated using model projections of the demand for excess reserves from the New York and Board staffs. The measurement of the forecast errors is imprecise because the projections are compared with actual holdings of excess reserves, which can be affected by last-day changes in reserve supplies or by the Desk's decision to over- or underprovide reserves in response to other considerations. Finally, the forecast error calculation does not take into account informal adjustments to the model forecasts that the Desk often makes on the basis of the observed pattern or distribution of excess reserve holdings during any given period.

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individual and corporate tax dates. The Treasury's total cash holdings during these periods often exceeded the capacities of banks' Treasury tax and loan accounts. In these circumstances, revenues or expenditures that were higher or lower than expected were fully passed through to the Treasury's balance at the Federal Reserve, sometimes resulting in large daily and period-average forecast misses. As in 1992, the largest first-day miss was in September, when higher than expected tax receipts led to a period-average error of just over $3 billion. To guard against an inadvertent overdraft, the Desk and the Treasury continued the practice, begun in 1992, of raising the "targeted" level of the Treasury balance to $7 billion for about two weeks after major tax dates while continuing to target a $5 billion balance at other times.

Forecasts of float, particularly at the outset of maintenance periods, deteriorated somewhat during 1993 relative to the previous year. An especially large weather-related float revision occurred in the first maintenance period ending in 1993, and inclement weather also made the task of forecasting float unusually difficult at other times.

Another factor affecting forecast errors in 1993 was the continued hefty premiums associated with RP transactions arranged by the Desk. The formal measure of the reserve impact of any open market operation is based on the par value of the securities involved. The difference between the par value and the cash amount is treated as a forecast miss in the "other items" component of nonborrowed reserves. In the case of RPs, the dealers, rather than the Fed, choose the collateral. Depending on their choices, which are not known to the Desk until after the operation is completed, the premium can vary considerably. In 1993 the Desk made informal allowances for the expected amount of the premia in choosing the size of its operations, and thus some portion of these premia was anticipated. During the year, the continued decline in interest rates lifted the prices of many issues further above par and consequently increased the average premia on reserve operations. Net premia on securities held under RP averaged about 8 percent of the par value of the operations for the year, compared with about 5 percent the year before, and ranged from a high of 32 percent to a low of 0.01 percent.

Table A5

System Temporary Transactions

Billions of Dollars

	1993		1992	
	Number†	Volume	Number†	Volume
Repurchase agreements				
System	109	510.5	80	392.9
Maturing next business day	29	149.5	27	117.1
Term	80	361.0	53‡	275.9
Fixed term	31	127.2	9	40.8
Withdrawable	49	233.8	45	235.0
Customer-related	54	117.1	64	140.4
Matched sale-purchase agreements				
In market	5	10.9	20	28.6
Maturing next business day	3	7.2	17	23.0
Term	2	3.8	3	5.7
With foreign accounts§	252	1464.1	253	1453.8
Total temporary transactions	420	2102.7	417	2015.8
in market	168	638.6	164	562.0

Note: Figures may not add to totals because of rounding.

† Number of rounds. If the Desk arranged repurchase agreements with two different maturities on the same day, the agreements are treated as one round. The Desk arranged such multiple agreements on two days in 1993 and on one day in 1992.

‡ Two term repurchase agreements arranged on September 24, 1992, are counted separately as one withdrawable and one fixed term.

§ Volumes exclude amounts arranged as customer-related repurchase agreements.

Table A6

Approximate Mean Absolute Forecast Errors for Various Forecasts of Reserves and Operating Factors

Millions of Dollars

	1993			1992		
	First Day	Midperiod	Final Day	First Day	Midperiod	Final Day
Reserves						
Required	290–335	160–180	55–65	350–365	245–270	80
Excess†	170–220	160–175	—	220–245	210	—
Factors	785–885	420–470	55–70	1005–1095	385–465	60–85
Treasury	725–760	365–485	40–45	700–830	240–330	45–50
Currency	330–400	160–210	10–20	355–430	140–215	20–40
Float	240–245	150–180	35–65	180–190	135	35–45
Pool	270	111	15	245	140	10

Note: A range indicates varying degrees of accuracy by the New York Reserve Bank and Board of Governors staffs.

† The reported forecast errors overstate the degree of uncertainty about excess reserves. The Desk supplements beginning-of-period and midperiod model forecasts with informal adjustments that are based on the observed pattern and distribution of estimated excess reserve holdings as each maintenance period unfolds.

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Foreign Exchange Operations of the Treasury and the Federal Reserve

February–April 1994

During the February-April period, the dollar declined 4.6 percent against the German mark, 6.5 percent against the Japanese yen, and 3.6 percent on a trade-weighted basis.[1] On the last business day of the period, April 29, the Federal Reserve Bank of New York's Foreign Exchange Desk entered the market to purchase $500 million against the German mark and $200 million against the yen for the U.S. monetary authorities. Contemporaneously, Treasury Secretary Bentsen issued a statement confirming the intervention. In other operations, the Desk liquidated the non-yen and non-mark reserves of the Federal Reserve System and the U.S. Treasury Department's Exchange Stabilization Fund (ESF). Following the assassination of the leading Mexican presidential candidate, U.S. monetary authorities provided a $6 billion temporary swap facility to Mexico. This was superseded on April 26, when the monetary authorities of the United States, Canada, and Mexico announced the creation of the North American Financial Group and the establishment of a trilateral foreign exchange swap facility.

The dollar rises briefly in early February

As the period opened, many market participants had positioned themselves for an extended dollar rally. This anticipated appreciation of the dollar rested in part on the expectation that interest rate differentials would start to move more rapidly in the dollar's favor. Dealers believed that with the U.S. economy strengthening, the Federal Reserve would eventually tighten monetary conditions in the United States, perhaps by the end of the first quarter. Dealers also expected the Bundesbank to lower short-term German interest rates quickly, allowing rates in other parts of Europe to fall as well. Against this backdrop, market participants entered the period holding substantial long-dollar positions against the mark and the yen, and also holding large positions in European government bonds. On February 4, Chairman Greenspan announced the decision of the Federal Open Market Committee (FOMC) to increase pressure on bank reserves, a move that resulted in an increase in the federal funds rate from 3.0 to 3.25 percent. The dollar spiked higher in the days immediately following the tightening, reaching period highs of DM 1.7675 and ¥109.65 before starting to drift lower (Charts 1 and 2).

The dollar declines first against the yen and then the mark

As the February 11 summit meeting between President Clinton and Japanese Prime Minister Hosokawa approached, market participants increasingly expected the two leaders to announce a compromise resolution of the trade issues under discussion between the two countries in bilateral "framework" talks. Correspondingly, expectations grew that the dollar would start to appreciate once the meeting was over, and market participants began to build up significant long-dollar positions. The dollar closed at ¥108.13 on Thursday, February 10. Reflecting this positive sentiment toward the dollar, the premium on dollar put options over equally out-of-the-money dollar call options diminished a few days before the meeting. Thus, when President Clin-

This report, presented by Peter R. Fisher, Senior Vice President, Federal Reserve Bank of New York, and Manager for Foreign Operations, System Open Market Account, describes the foreign exchange operations of the U.S. Department of Treasury and the Federal Reserve System for the period from February 1994 through April 1994. Ladan Archin was primarily responsible for preparation of this report.

[1] The dollar's movements on a trade-weighted basis are measured using an index developed by staff at the Board of Governors of the Federal Reserve System.

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ton and Prime Minister Hosokawa announced late in the afternoon on Friday, February 11, that they had failed to reach an agreement and were suspending the framework talks, surprised market participants began to unwind their long-dollar positions. The dollar began to decline in late New York trading and continued to move lower through Asian, European, and early New York dealings on Monday, February 14. The dollar's price adjustment against the yen culminated at about midday, when the dollar dropped sharply to an intraday low of ¥101.10. The dollar recovered by the end of the day, however, and traded above ¥103 for the balance of the month.

As the Bundesbank's February 17 council meeting approached, market participants anticipated that the German central bank would act to lower interest rates for the first time since early December 1993. While the Bundesbank did reduce its discount rate by 50 basis points to 5.25 percent, it disappointed these expectations by leaving its key money market rate, the securities repurchase rate, unchanged. The dollar-mark exchange rate began to trade lower in subsequent days, but sharp sell-offs in U.S. and European bond markets generally dominated market attention during late February.

In early March, the dollar traded above the ¥105 level, gaining support from signs that Japan was considering private and public initiatives to address its trade surplus. Market participants also appeared to take comfort in the fact that the Clinton Administration's decision to revive "Super 301" trade sanction powers would not result—at least in the short term—in new trade sanctions. However, in mid-March attention increasingly focused on reports that substantial foreign flows of funds into Japanese equity and bond markets were leading to further strength in the yen.

Against the mark, a slower than expected narrowing of short-term interest rate differentials weighed on the dollar during much of March. A surge in German M3 money supply growth, coupled with growing frustration over the Bundesbank's cautious step-by-step reduction of its securities repurchase rate, spurred market participants to reassess their expectation of sharply lower German interest rates (Chart 3). These developments also encouraged the view that further rate reductions by the Bundesbank would be calibrated to the Fed's rate increases to minimize the impact on the dollar-mark exchange rate. In this environment, the second 25 basis point rate increase in the federal funds rate resulting from the FOMC's decision, announced after its March 22 meeting, had little impact on the dollar.

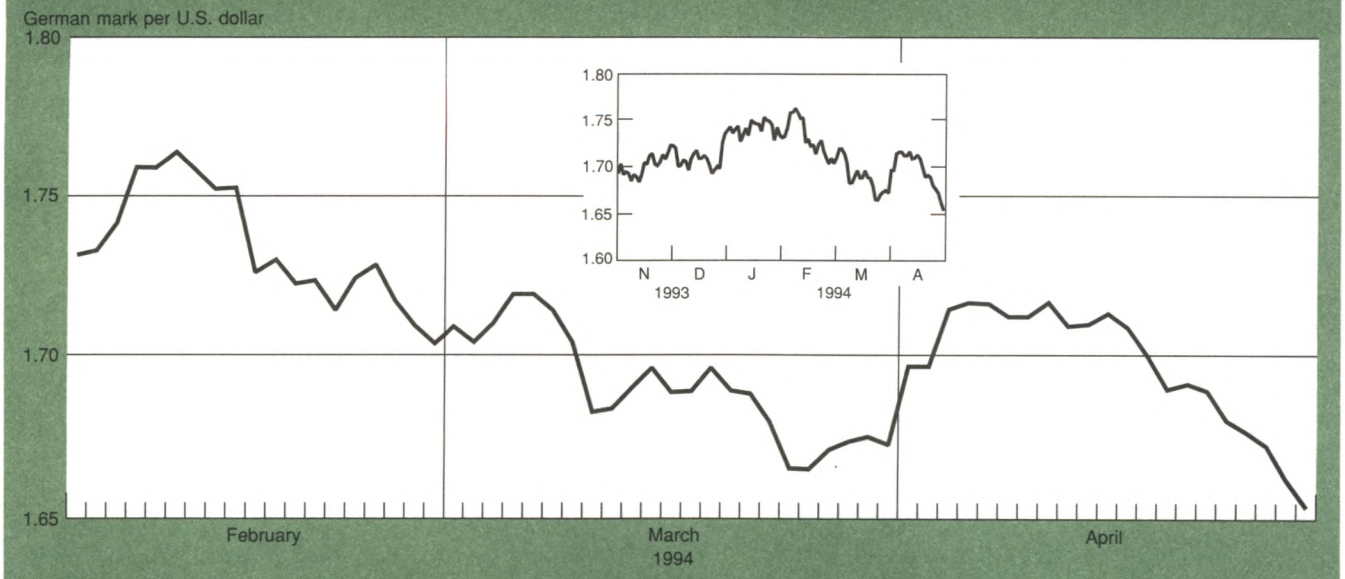
The dollar moves up and then down in April

In early April, the dollar moved higher against the mark and

Chart 1

The Dollar against the German Mark

Spot Exchange Rate



Source: Federal Reserve Bank of New York.

Note: Inset panel shows the six-month exchange rate movement.

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the yen on a much higher than expected increase in March U.S. nonfarm payrolls and on a brief recovery in U.S. securities prices. The dollar soon came under pressure against the yen, however, when the resignation of Prime Minister Hosokawa led to a widespread perception in the foreign exchange market that the bilateral trade talks would encounter further delays. Political uncertainty in Japan lingered, and dealers came to doubt whether Japan would be able to meet its commitment to have a new package of market-opening measures in place before the Group of Seven (G-7) summit in July. The political uncertainty in Japan also created a concern among dealers that the Japanese government would be unable to pass measures to stimulate domestic demand and that the yen would consequently appreciate over the longer term as well.

During April, a change in market perception strengthened the mark against both the dollar and the yen. With the Bundesbank easing cautiously since mid-February, the expected trend in short-term German interest rates, as implied by several series of Euromark futures contracts, backed up sharply over the latter part of the period (Chart 5). The surprise announcement by the Bundesbank on April 14 that it was cutting its discount and Lombard rates by 25 basis points, to 5.0 and 6.5 percent, respectively, appeared to signal to market participants that further significant near-term easing was unlikely. This change in sentiment can be seen in the flattening of near-term Euromark contracts around the 5 percent level (Chart 5). This was followed by the announcement of a third 25 basis point increase in the federal funds rate on April 18. With market participants perceiving little prospect for a further narrowing in the interest differential in the short run, the mark strengthened against both the dollar and the yen as the short end of the German yield curve looked increasingly attractive.

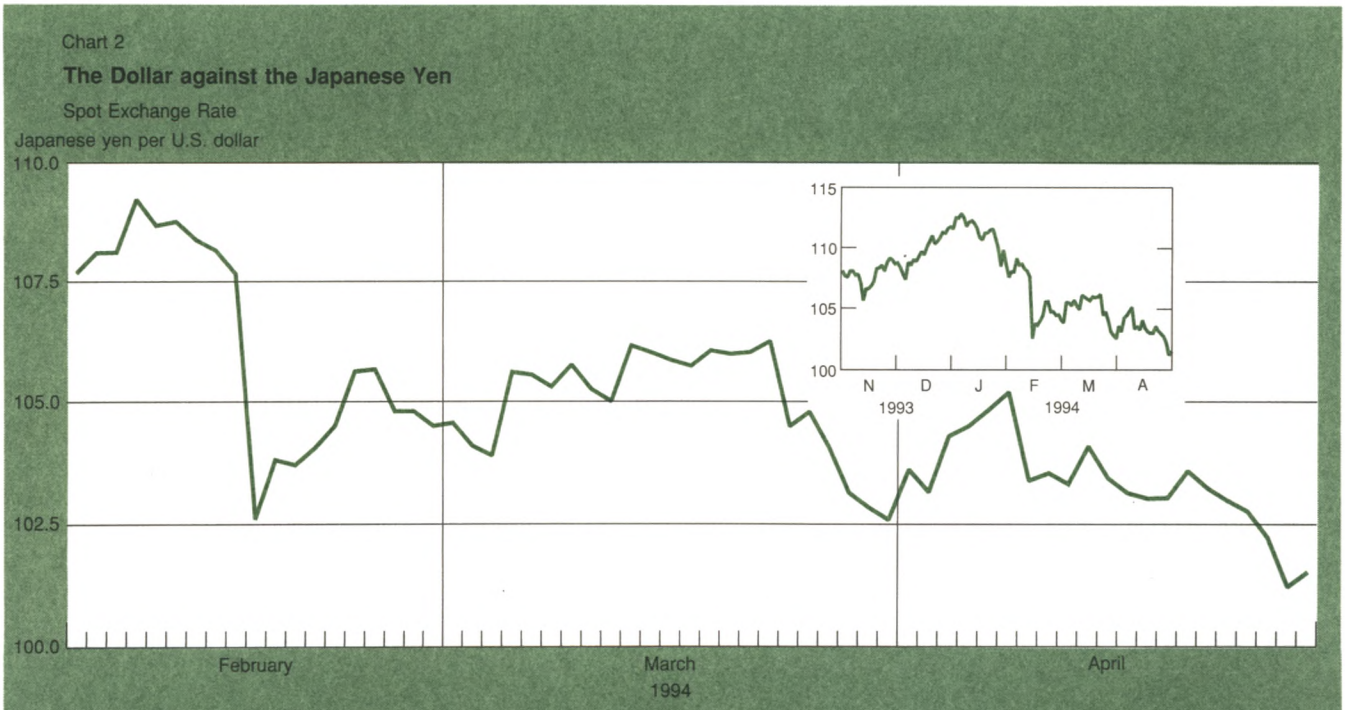
The mark continued to rise against the dollar through the end of April, even though expected interest rate differentials, as implied by futures contracts on Eurodollar and Euromark deposits, were now moving more clearly in the dollar's favor (Charts 3 and 4). Sentiment toward the dollar became increasingly negative as dealers expressed growing anxiety that the dollar-yen exchange rate might drop swiftly below its historical lows. This risk was reflected in options markets, where dollar put options traded at a substantial premium over equally out-of-the-money dollar call options. With market participants focused on the risk that the dollar might decline against the yen, and the mark receiving solid support against the yen at the ¥60 per mark level, the prospect for the dollar appreciating against the mark appeared remote.

Following the G-7 meetings on the weekend of April

Chart 2

The Dollar against the Japanese Yen

Spot Exchange Rate



Source: Federal Reserve Bank of New York.

Note: Inset panel shows the six-month exchange rate movement.

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23–24, market participants were somewhat disappointed over the lack of official guidance on exchange rates, and the dollar began to move down against both the mark and the yen. At this time, a perception was growing that dollar weakness had begun to affect the U.S. bond market adversely, and market participants expressed concern that a lower dollar would spark inflationary pressures and thereby diminish the value of dollar-denominated assets. Dealers increasingly focused on the parallel movements in U.S. bond prices and the value of the dollar. On Thursday, April 28, the U.S. bond market recorded sharp losses, and the dollar approached its postwar low of ¥100.40 in thin and nervous trading.

U.S. monetary authorities enter the market to buy dollars against the mark and the yen

On Friday, April 29, in early New York trading, the dollar started to drop abruptly against the mark, falling nearly two pfennigs in less than an hour before bottoming out at a six-month low of DM 1.6440. At the time, the dollar was trading just below ¥102. Trading became increasingly volatile, with market participants reporting that dealers were not answering phones and that customers were having trouble finding out whether their orders had been filled. Shortly before 10:30 a.m., the Federal Reserve Bank of New York's Foreign Exchange Desk entered the market, purchasing dollars against the mark for the U.S. monetary authorities. Soon thereafter, Treasury Secretary Lloyd Bentsen issued the following statement confirming the intervention:

> U.S. monetary authorities intervened today in foreign exchange markets to counter disorderly conditions. This is in line with our previously articulated policy which recognizes that excessive volatility is counterproductive to growth. We stand ready to continue to cooperate in foreign exchange markets.

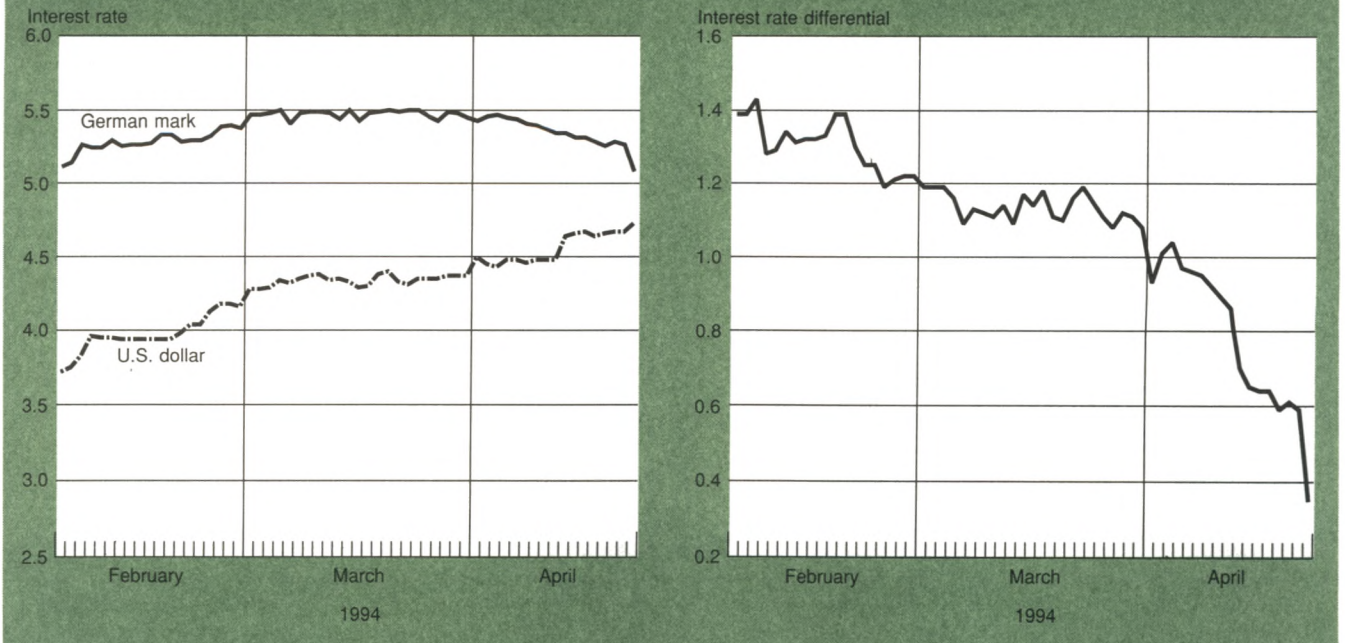
Shortly before 11:30 a.m., the Desk again entered the market, purchasing dollars against both the mark and the yen. In total, U.S. monetary authorities purchased $500 million against the mark and $200 million against the yen; these amounts were equally divided between the Federal Reserve and the ESF.

Following the intervention, the dollar began to gain ground in orderly trading, reaching an intraday high of 1.6635 against the mark and 102.50 against the yen. The dollar drifted lower in the afternoon, however, and closed the period at DM 1.6535 and ¥101.55.

Chart 3

Differential between German Mark and Dollar Short-Term Interest Rates

Implied by the Three-Month Eurodeposit Futures (June 1994 Contracts)



Source: Bloomberg L.P.

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North American swap lines

Following the March 23 assassination of Luis Donaldo Colosio, the presidential candidate of Mexico's Institutional Revolutionary Party (PRI), U.S. monetary authorities established a $6.0 billion temporary bilateral swap facility for the Bank of Mexico at the request of the Mexican authorities. The facility included reciprocal swap arrangements already in place. The assassination of Colosio had prompted the closing of Mexican markets on March 24 and gave rise to concerns that the reopening of the markets on March 25 would be accompanied by market disorders that could spill over into the U.S. financial markets. No drawings were made on this facility.

On April 26, the monetary authorities of the United States, Canada, and Mexico announced the creation of the North American Financial Group to provide a forum for more regular consultation on economic and financial developments and policies in these countries. These arrangements were unrelated to developments in Mexico; they had been planned several months earlier in recognition of the three nations' increasingly interdependent economic relationships. In connection with the creation of the North American Financial Group, the monetary authorities of the three countries announced the establishment of the trilateral foreign exchange swap facility to expand the pool of potential resources available to the monetary authorities of each country to maintain orderly exchange markets. The United States and Mexico put in place swap agreements for up to $6.0 billion, with the Treasury and the Federal Reserve each participating up to $3.0 billion. In addition, the Bank of Canada and the Bank of Mexico expanded their existing swap agreement to C$1.0 billion. Finally, the Federal Reserve and the Bank of Canada reaffirmed their existing swap agreement in the amount of $2.0 billion. Each party has reciprocal privileges to draw on the other's currency in

Table 1

Foreign Exchange Holdings of U.S. Monetary Authorities at Period End

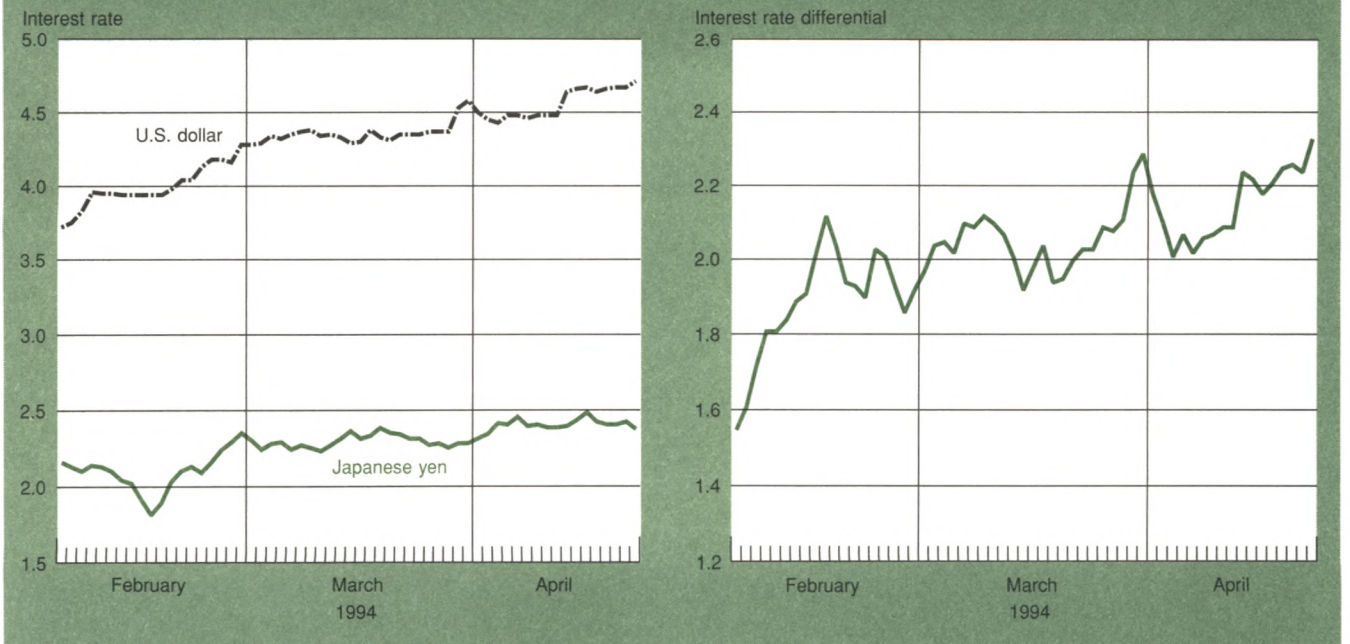
Millions of Dollars

	Federal Reserve	U.S. Treasury Exchange Stabilization Fund
German marks	13,615.8	8,413.7
Japanese yen	9,375.3	12,600.3
	22,991.1	21,014.0

Chart 4

Differential between Dollar and Japanese Yen Short-Term Interest Rates

Implied by the Three-Month Eurodeposit Futures (June 1994 Contracts)



Source: Bloomberg L.P.

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amounts equivalent to the amounts indicated.

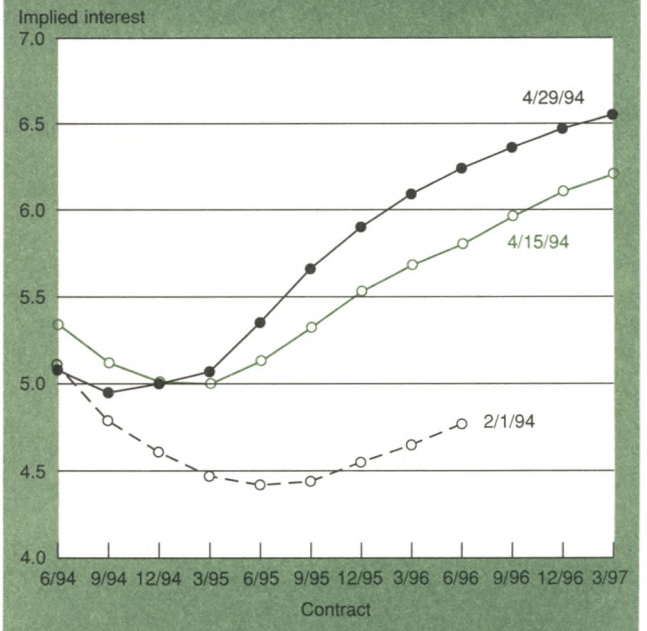
The Mexican peso, which opened the period at 3.1060, traded to a low of 3.3694 per dollar following the assassination but strengthened toward the end of the period to close at 3.2700 pesos per dollar.

Other operations

During the period, the Federal Reserve Bank of New York sold in the market all non-mark and non-yen foreign exchange reserve holdings of the Federal Reserve and the Exchange Stabilization Fund (ESF) of the U.S. Treasury. The Federal Reserve liquidated the equivalent of $703.8 million, while the ESF liquidated the equivalent of $64.4 million. Swiss francs represented $629.0 million of the amount liquidated by the Federal Reserve and $37.3 million of the amount liquidated by the Treasury. Swiss franc sales took place on the following days: February 15, February 22, March 1, March 8, April 5, April 12, and April 26. The remaining sales for the account of the Federal Reserve were as follows: $1.0 million of Belgian francs on February 25, $38.0 million of Dutch guilders on March 29, $0.3 million of Canadian dollars on March 29, $26.9 million of British pounds on April 12, and $8.7 million of French francs on April 12. The remaining sale for the account of the Treasury was a liquidation of $27.1 million of British pounds on

Chart 5

Interest Implied by Euromark Futures Contracts



Source: Bloomberg L.P.

Table 2

U.S. Treasury and Federal Reserve Foreign Exchange Operations Net Profits (+) or Losses (–), Based on Historical Cost-of-Acquisition Exchange Rates

Millions of Dollars

	Federal Reserve	U.S. Treasury Exchange Stabilization Fund
Valuation profits and losses on outstanding assets and liabilities as of January 31, 1994	2,868.4	2,513.0
Realized January 31–April 29, 1994	81.7†	5.6‡
Valuation profits and losses on outstanding assets and liabilities as of April 29, 1994	4,163.4	3,804.9

Note: Data are on a value-date basis.

† This figure represents net realized profit on market sales of Swiss francs, British sterling, Canadian dollars, French francs, Belgian francs and Dutch guilders. The figure excludes intervention sales transacted on April 29, which settled during the first week of May and are thus not reflected here.

‡ This figure represents net realized profit on market sales of Swiss francs and British sterling. The figure excludes intervention sales transacted on April 29, which settled during the first week of May and are thus not reflected here.

Table 3

Federal Reserve Reciprocal Currency Arrangements

Millions of Dollars

Institution	Amount of Facility	Drawings During Period
Austrian National Bank	250	0
National Bank of Belgium	1,000	0
Bank of Canada	2,000	0
National Bank of Denmark	250	0
Bank of England	3,000	0
Bank of France	2,000	0
Deutsche Bundesbank	6,000	0
Bank of Italy	3,000	0
Bank of Japan	5,000	0
Bank of Mexico	3,000	0
Netherlands Bank	500	0
Bank of Norway	250	0
Bank of Sweden	300	0
Swiss National Bank	4,000	0
Bank for International Settlements:		
Dollars against Swiss francs	600	0
Dollars against other authorized European currencies	1,250	0
Total	32,400	0

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April 26. It was decided to eliminate these currency holdings in light of the U.S. monetary authorities' practice in recent years of conducting intervention operations in German marks and Japanese yen. The sales were conducted in accordance with a schedule reflecting the maturity of investments in the individual currencies.

At the end of the period, the current values of the foreign exchange reserve holdings of the Federal Reserve and the U.S. Treasury were $23.0 billion and $21.0 billion, respectively. These holdings are invested in a variety of instruments that yield market-related rates of return and have a high degree of liquidity and credit quality. The Federal Reserve and the U.S. Treasury held, either directly or under repurchase agreements, $11.7 billion and $11.3 billion, respectively, in foreign government securities.

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Treasury and Federal Reserve Foreign Exchange Operations

November 1993–January 1994

The dollar appreciated modestly against most major currencies during the November-January period. It rose 2.9 percent against the German mark, 0.1 percent against the Japanese yen, and 0.5 percent on a trade-weighted basis.[1] The U.S. monetary authorities did not undertake any intervention operations during the period.

The dollar ends the period virtually unchanged against the yen

After opening at ¥108.64 on November 1, the dollar rose against the yen in thin year-end markets, reaching a high of ¥113.55 before coming down to end the period unchanged. Initially, the dollar rose as market participants turned their attention to Japan's lingering recession and to the prospect of interest rate differentials moving in favor of the dollar. This shift in focus was prompted by continued weakness in Japanese money supply growth, employment, industrial production, and retail sales. Moreover, Japanese equity prices dropped sharply in November—with the Nikkei stock index falling nearly 17 percent over the course of the month—and remained volatile throughout December. Growing pessimism over the economic outlook for Japan, as well as the uncertain prospects for the Hosokawa government's long-awaited fiscal stimulus package, helped fuel expectations of an additional cut in the Bank of Japan's Official Discount Rate (ODR).

Over the course of December, trading activity in the dollar-yen exchange market started to ebb as first corporate and then interbank participants pulled back from the market ahead of the year-end holidays. Japanese exporters, who regularly sell dollars to the market to hedge their foreign currency receivables, were notably absent towards the end of the month. In this environment, market conditions were increasingly characterized by the dominance of technically oriented traders who bought up the U.S. currency in anticipation of further dollar gains, and the dollar rose gradually through December from a low of ¥107.37 to a high of ¥112.05.

In late December, Treasury Secretary Bentsen was asked whether he saw a need to intervene in the foreign exchange market to stem the yen's decline. He responded that he did not think intervention would be necessary, but rather thought that the foreign exchange market would focus on Japan's substantial trade surplus when determining the relative value of the dollar and the yen. Secretary Bentsen expressed concern that Japan was not meeting its commitment to achieve domestic demand-led growth and a significant reduction in its external surplus. He expanded on this view in early January when he said that the proper way for Japan to address its economic imbalances was through a combination of effective fiscal stimulus and market-opening measures, not through a depreciation of the yen.

The dollar reached its period high of ¥113.55 on January 5, but soon drifted lower when expected movements in interest rates failed to materialize. Market participants turned their attention to the shifting fortunes of Japanese political reform and to bilateral trade talks with the United States,

This report, presented by Peter R. Fisher, Senior Vice President, Federal Reserve Bank of New York, and Manager for Foreign Operations, System Open Market Account, describes the foreign exchange operations of the U.S. Department of the Treasury and the Federal Reserve System for the period from November 1993 through January 1994. Nicholas Pifer was primarily responsible for preparation of the report.

[1] The dollar's movements on a trade-weighted basis are measured using an index developed by staff at the Board of Governors of the Federal Reserve System.

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but they were unable to develop a lasting view on how the success or failure of these two initiatives would affect exchange rates. Reflecting the market's uncertainty about the near-term direction of the dollar against the yen, the implied one-month option volatility for the dollar-yen exchange rate spiked higher in the second half of January. At the same time, foreign investors purchased the equivalent of $10.5 billion in Japanese equities during January; these flows contributed to a sharp rebound in Japanese stock prices and helped support the yen.

The upper house of the Japanese Diet passed Prime Minister Hosokawa's political reform bill on January 29, permitting the government to turn its attention to other policy issues. As the period came to a close, U.S.-Japan trade talks were continuing and the Japanese government was reportedly at work on a record stimulus package for the economy. Reflecting the positive implications of such a package for Japanese domestic demand growth, the Nikkei surged nearly 8 percent on the last day of the period and expectations of additional interest rate cuts in Japan receded even further. These factors helped strengthen the yen, and the dollar closed at ¥108.65 on January 31.

The dollar appreciates modestly against the mark

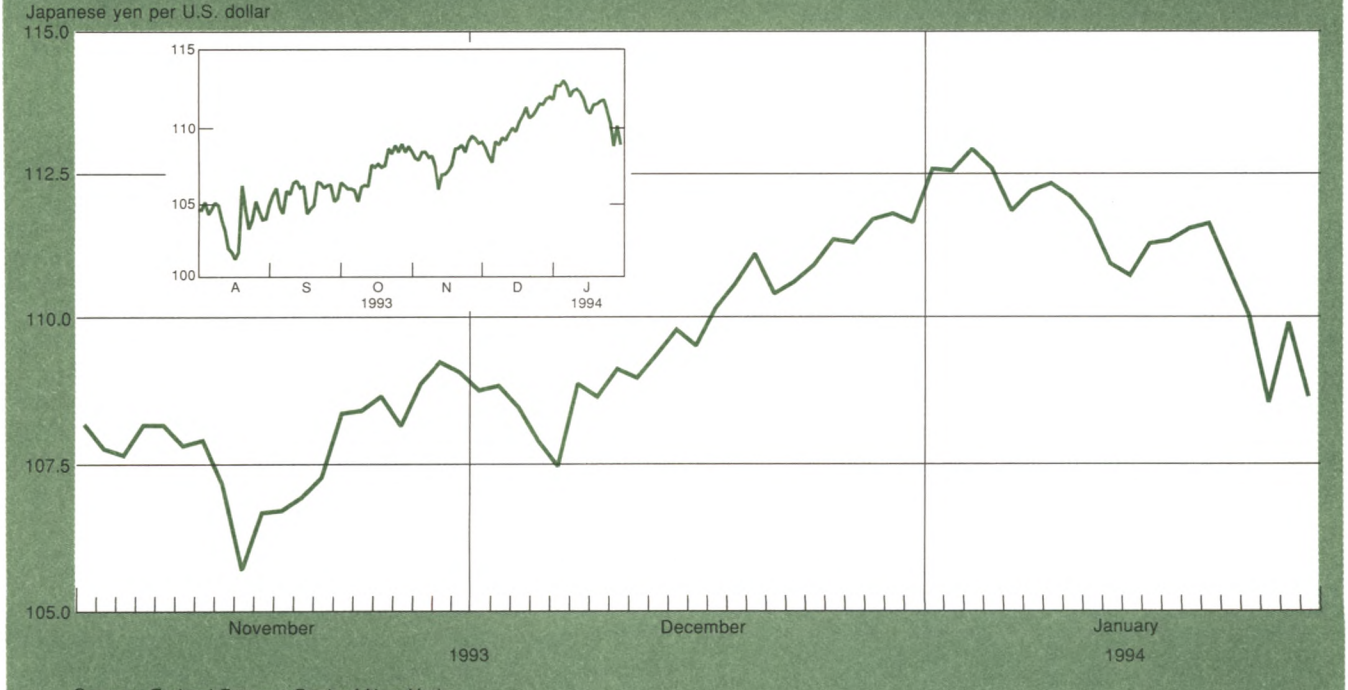
During November and most of December, the dollar was relatively stable against the German mark, trading in a narrow range around the DM 1.70 level. Market sentiment towards the dollar was generally positive, however, with dealers taking note of the increasingly divergent paths of the U.S. and German economies. In this environment, market participants began to anticipate a fairly rapid convergence of short-term German and U.S. interest rates. The Bundesbank, which had surprised the foreign exchange market in late October when it cut its discount and Lombard rates by 50 basis points, trimmed its key money-market repurchase rate from 6.40 percent at the start of the period to 6.25 percent on December 1. At its December 2 council meeting, the Bundesbank announced a prefixed rate of 6.0 percent for the next five-weekly auctions of fourteen-day repurchase agreements. Market participants generally interpreted this move as an effort to nudge short-term interest rates lower while also dampening speculation of further monetary easing.

The dollar broke out of its trading range in late December, jumping four pfennigs higher in the last three days of

Chart 1

The Dollar against the Japanese Yen

Spot Exchange Rate



Source: Federal Reserve Bank of New York.

Note: Inset panel shows the six-month exchange rate movement.

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the month. Dealers expressed initial skepticism over the rise, which occurred in thin year-end markets. Nonetheless, the dollar subsequently extended its gains to reach a twenty-eight-month high of DM 1.7562 on January 14. As the dollar moved higher, it gained broad support from a series of U.S. and German statistical releases—notably retail sales, factory orders, and the purchasing managers index for the United States, and industrial production, unemployment, and real GDP for Germany—that further contrasted economic conditions in the two countries.

During the latter part of January, the dollar settled into a new trading range against the mark. Expectations of near-term volatility in the dollar-mark exchange rate dropped off sharply, with the implied one-month option volatility falling from nearly 12 percent in early January to less than 9 percent at month-end. While market rumors of central bank sales helped cap the dollar's rise, movements in actual and expected interest rate differentials also weighed on the U.S. currency. At its two January meetings, the Bundesbank Council kept its repurchase rate fixed at 6.0 percent, disappointing the market and further deflating expectations about the pace of German interest rate cuts. Similarly, a perceived lack of inflationary pressures in the United States led dealers to rethink their expectations of a near-term hike in short-term U.S. interest rates. During most of January, therefore, differentials in three-month Eurodeposit rates, as well as those in the expected three-month deposit rates implied by futures prices, moved in the mark's favor. The dollar closed the period on January 31 at DM 1.7338.

Other operations

As of the end of January, cumulative valuation gains on outstanding foreign currency balances were $2,868.4 million for the Federal Reserve and $2,513.0 million for the Treasury's Exchange Stabilization Fund (ESF). There were no realized profits or losses for the quarter.

The Federal Reserve and the ESF regularly invest their foreign currency balances in a variety of instruments that yield market-related rates of return and have a high degree of liquidity and credit quality. A portion of the balances is invested in securities issued by foreign governments. As of the end of January, the Federal Reserve and the ESF held either directly or under repurchase agreements $10,740.5 million and $10,436.2 million, respectively, in foreign government securities valued at end-of-period exchange rates.

Chart 2

Differential between Dollar and Yen Interest Rates

Implied by the Three-Month Eurodeposit Futures (March 1994 Contracts)

Source: Bloomberg L.P.

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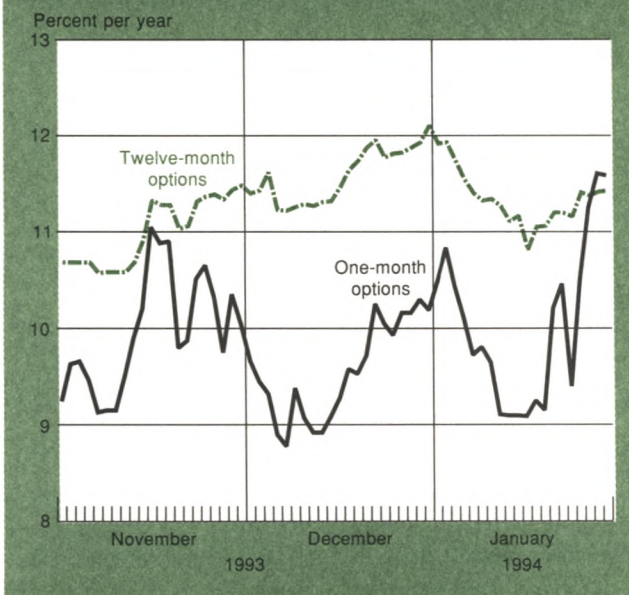
Chart 3

Dollar-Yen Exchange Rate Volatility Implied by Option Prices



Source: Reuters.

Table 1

Federal Reserve Reciprocal Currency Arrangements

Millions of Dollars

Institution	Amount of Facility January 31, 1994
Austrian National Bank	250
National Bank of Belgium	1,000
Bank of Canada	2,000
National Bank of Denmark	250
Bank of England	3,000
Bank of France	2,000
Deutsche Bundesbank	6,000
Bank of Italy	3,000
Bank of Japan	5,000
Bank of Mexico	700
Netherlands Bank	500
Bank of Norway	250
Bank of Sweden	300
Swis National Bank	4,000
Bank for International Settlements:	
Dollars against Swiss francs	600
Dollars against other authorized European currencies	1,250
Total	30,100

Table 2

Net Profit (+) or Losses (–) on United States Treasury and Federal Reserve Foreign Exchange Operations

Millions of Dollars

	Federal Reserve	U.S. Treasury Exchange Stabilization Fund
Valuation profits and losses on outstanding assets and liabilities as of October 31, 1993	+3,368.5	+2,839.0
Realized profits and losses November 1, 1993–January 31, 1994	0.0	0.0
Valuation profits and losses on outstanding assets and liabilities as of January 31, 1994	+2,868.4	+2,513.0

Note: Data are on a value-date basis.

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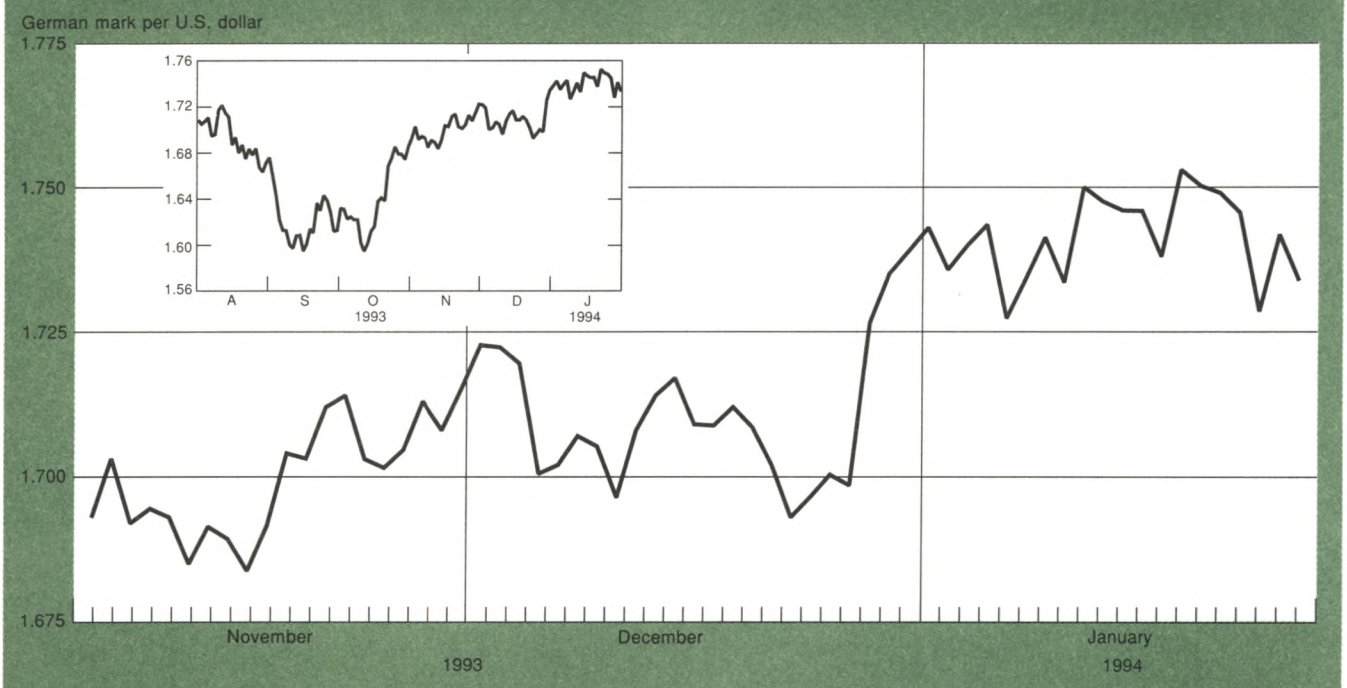
Chart 4

The Dollar against the German Mark

Spot Exchange Rate



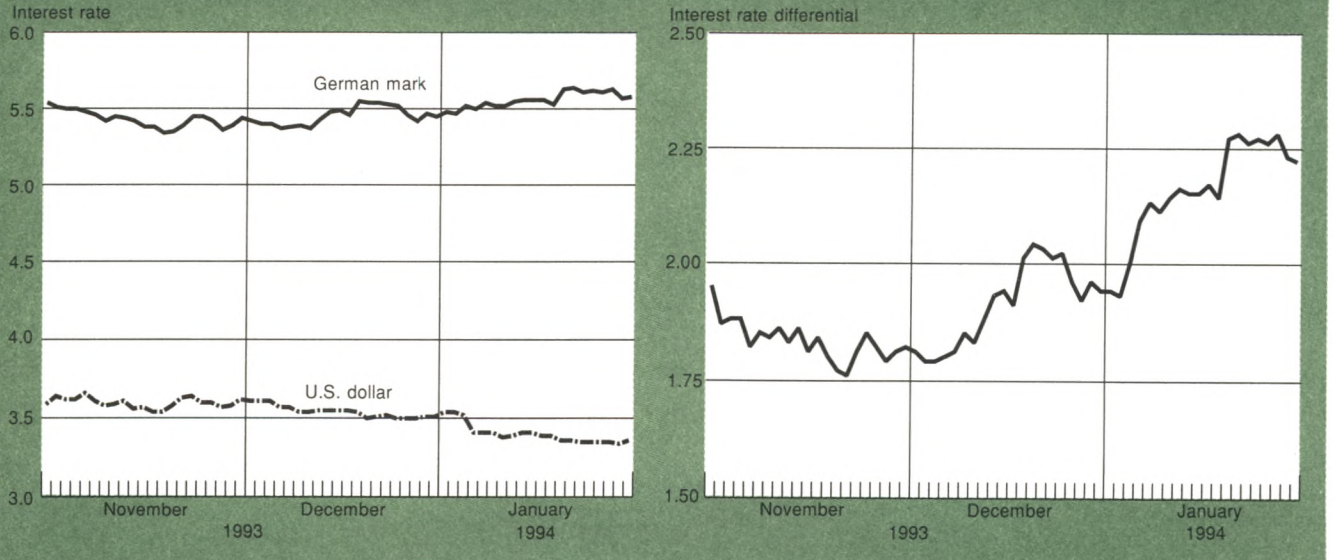
Source: Federal Reserve Bank of New York.

Note: Inset panel shows the six-month exchange rate movement.

Chart 5

Differential between German Mark and Dollar Interest Rates

Implied by the Three-Month Eurodeposit Futures (March 1994 Contracts)



Source: Bloomberg L.P.

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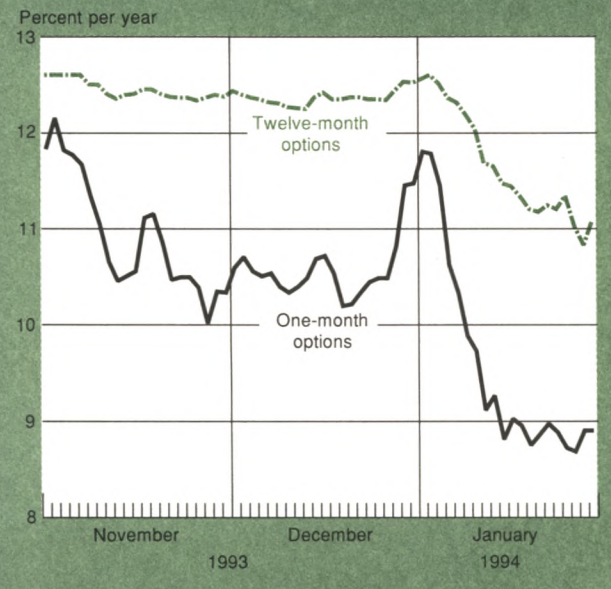
Chart 6

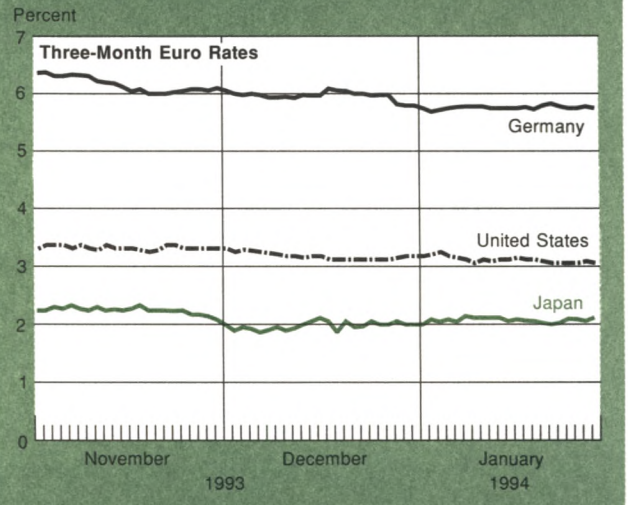
Dollar-Mark Exchange Rate Volatility Implied by Option Prices



Source: Reuters.

Chart 7

Short-Term Interest Rates for Selected Countries



Source: Bank for International Settlements.

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