Federal Reserve Bank of Richmond

2004 ANNUAL REPORT

What's Driving Wage Inequality?
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MISSION

As a regional Reserve Bank, we work within the Federal Reserve System to foster the stability, integrity, and efficiency of the nation's monetary, financial, and payments systems. In doing so, we inspire trust and confidence in the U.S. financial system.

VISION

We want to be a standard of excellence within the Federal Reserve System and continuously improve our service to our customers and the public. Because success depends on each of us, we are striving to create a workplace where we all live our Bank's values and can reach our full potential.

MESSAGE FROM THE PRESIDENT

Jeffrey M. Lacker
President

In 2004, the economic recovery from the recession of 2001 began to set down firm roots. Broad measures of economic activity showed healthy gains, with real output, for example, growing by roughly 4 percent over the year. We saw continued strength in consumption spending in 2004 and a significant acceleration in investment. At the same time, inflation has remained steady this past year, and, just as importantly, inflation expectations have been contained.

Perhaps the key improvement in 2004 has been the long-awaited pickup in net job growth. As is well known, employment in this recovery has lagged behind the pace of other postwar U.S. recoveries, but the rate of new hiring finally accelerated in the spring. At the end of the year, employment was 2.2 million ahead of a year ago, an average gain of 184 thousand workers per month. This 1.7 percent gain comfortably exceeds the working-age population growth rate of just under 1 percent, and thus notable progress has been made toward absorbing the overhang of those who are willing to work. Yet there remains substantial anxiety among workers, especially in sections of the Fifth District.

For instance, certain industries within the manufacturing sector—particularly, the textile and furniture industries, which are largely located in the Carolinas—have been hard hit by job losses. Tens of thousands of workers in these industries have lost their jobs in the past several years, and many have little real hope of securing similar positions, since those industries are unlikely to expand their workforces in the near future. In addition, the new jobs that have been created recently in different industries for which those workers' skills are a good match often do not pay as well. The workers are looking at significant and perhaps sustained income losses.

The relatively bright economic picture I described earlier must seem unreal or at least irrelevant for many of the people affected by job losses. To them, the economy appears to be moving in an unhealthy direction—one in which well-paying jobs in traditionally powerful American industries are being lost, and one in which the gap in wages between those at the top and those at the bottom of the distribution is widening.

Empirically, there is some truth to these claims. Wage dispersion *has* been growing for almost 30 years, though that trend appears to have been slowing recently, according to some measures. Also, the real wages of many workers have been stagnant or falling during this extended period of growing wage inequality. Thus, the concerns that many people have about the economy tend to be less about aggregate performance and more about distributional consequences.

The following essay in our *2004 Annual Report* considers what has been causing the rise in wage inequality. It concludes that new technologies have improved the productivity of skilled workers relative to unskilled workers and thus have fueled wage inequality. Economists call such technologies "skill-biased," and they refer to their introduction as "skill-biased technical change."

Many observers have pointed to the information technology revolution as a prime example of skill-biased technical change in the late twentieth century. Computers, after all, are good at doing certain types of tasks—tasks that can be described by a "program," which is just a set of rules. And often, these tasks were previously more likely to be performed by less-skilled workers. IT-related skill-biased technological change then appears to be an important part of the explanation for rising wage inequality.

But there are other ways in which technology affects labor markets. Technological change can be disruptive. New products and new ways of producing arrive, and skills that were tied to the old ways of doing things lose value, sometimes dramatically. This is what economist Joseph Schumpeter famously called the "perennial gale of creative destruction." In this environment, some unskilled workers are doubly unlucky. First, skill-biased technological change can lower the relative demand for unskilled labor, reducing their wages relative to skilled workers. As I argued earlier, this scenario is what happened in the late twentieth century.

Second, because less-skilled workers have less education, the skills they do have tend to be based on the specific experience they have accumulated. When those skills do not transfer well to other sectors, these workers are more vulnerable to long-term earnings losses should their industries suffer declines.

Given the effects of technological change on labor markets, what types of public policy responses should we pursue to ensure that all Americans have good employment opportunities? One response that has been suggested by many is to slow the pace of globalization in order to protect U.S. workers from foreign competition. But if the argument made in our essay is correct—that the growth in wage inequality has been fundamentally driven by skill-biased technological change—then trade restrictions would likely do little to achieve their intended goal. Meanwhile, they would likely lower aggregate income and overall social welfare. Instead, research suggests that a more useful approach would be to increase emphasis on education—particularly on acquiring general, broadly applicable skills early in life. Acquiring skills at a young age leads to rewards over the long term because individuals can recoup their investment in human capital throughout their working lives. In addition, such training tends to build on itself as acquiring skills early in life makes it easier to acquire additional skills later in life.

The essay's main intent, though, is not to provide detailed analyses of specific policy responses. It is, rather, to emphasize the role of technological change and the idea that the fundamental economic forces driving the increase in wage inequality are the same forces raising our general standard of living. I think the ideas put forth in the following pages provide essential insights about the factors affecting our economy—both nationally and in the Fifth District.

Jeffrey M. Lacker
President

What's Driving Wage Inequality?

The Effects of Technical Change on the Labor Market

By Aaron Steelman and John A. Weinberg

Most of the time, we assess an economy's performance using broad aggregate measures of output and wealth. In this regard, the United States is doing quite well. It is the richest country in the world. U.S. gross domestic product exceeded $11 trillion last year—roughly $38,000 per capita. And despite the slowdown associated with the 2001 recession, the economy has expanded at an average annual rate of more than 3 percent over the past 10 years. The way people actually feel about the economy's performance is shaped by their individual experiences, however, and here there is always great diversity. Indeed, there remains substantial anxiety about the direction the economy is heading, especially in regard to the growing disparity in income. The gap in real wage rates between those at the higher end of the distribution and those at the lower end has been widening for some time. In addition, the real wages of workers at the lowest part of the distribution were stagnant or falling during much of this extended period of growing wage inequality.

This essay will explain why wage inequality has been increasing in the United States; in doing so, we will draw upon the scholarly literature, including work done by Richmond Fed economist Andreas Hornstein with Per Krusell of Princeton University and Giovanni Violante of New York University. We also will discuss the associated policy implications—that is, what can be done to better assure that all Americans have the opportunity to secure well-paying jobs, as well as which policies may hinder that goal.

Overall, we will argue that technical innovation has significantly affected the wage distribution in the United States. But the direction of that effect has not been uniform. In the early part of the twentieth century, various technical innovations had the effect of compressing the wage structure. Since the 1970s, however, technical innovation—particularly the introduction and widespread use of information technology—has produced wage dispersion.

Another force to which many have attributed recent labor market developments is globalization. We conclude that international trade and immigration, while significant trends, are not by themselves the primary force behind growing wage inequality. To some extent, globalization is itself a result of advances in information technology, which allow the production of goods and services to take place over a broader geographic area.

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As for public policy, research suggests that increased emphasis on education is a sound response to recent trends in wage inequality, particularly education early in life and programs focusing on general, broadly applicable skills. Early skill acquisition yields rewards over a relatively long period of time because individuals can recoup their investment in human capital throughout their working lives. In addition, such training tends to build on itself: acquiring skills early in life makes it easier to acquire additional skills later in life. In contrast, policies that would aim to slow the growth in wage inequality by imposing barriers to globalization, such as trade restrictions, would likely do little to achieve their intended goal, while lowering aggregate income and overall social welfare.

Before discussing why wage inequality has been growing and the steps policy-makers may wish to consider in response, it is necessary to look at the facts. In the next section, we present data on wage inequality from the early twentieth century to the present.

THE FACTS

Most economists agree that wage inequality has been increasing in the United States recently.[1] But this has not always been so. Wage inequality was large during the first part of the twentieth century, decreased during the middle part of the century, and accelerated again toward the end of the century.

During the early part of the twentieth century, several factors contributed to a decline in the demand for less-skilled workers. For instance, the widespread introduction of electricity and new hoisting equipment in the 1910s greatly reduced the need for common laborers who moved goods to and within factories.[2] The lower demand for these workers' services put downward pressure on their wages. At the same time, the rise of large businesses increased the demand for the relatively small subset of workers with higher education to fill managerial roles, thus driving up their wages. As a result, wage inequality grew during the first quarter of the twentieth century.

"Wage inequality was large during the first part of the twentieth century, decreased during the middle part of the century, and accelerated again toward the end of the century."

By the 1940s, wage structures began to change significantly, however, so much in fact that Claudia Goldin and Robert Margo have called this period "The Great Compression," describing the general decline in wage inequality.[3] On the supply side, the once small number of college graduates began to face increased com-

petition, as thousands of American military personnel came back from World War II and took advantage of the GI Bill. This influx of newly minted graduates most likely helped depress the relative earnings of college-educated workers. In addition, the quality of education at the high school level became less variable during this period, meaning that the skill differentials between high school graduates in different parts of the country probably decreased, thus reducing the disparity in wage rates among this group of workers.

In the 1940s, wage inequality decreased as demand for less-skilled workers grew in the nation's booming manufacturing sector.

On the demand side, more low-skilled labor was needed in the nation's industrial centers to produce goods for the war effort, therefore driving up the relative wages of these workers. In addition, government intervention through the National War Labor Board almost certainly contributed to the compression of the wage structure.[4]

It is interesting to note that there is also evidence of wage compression in the United Kingdom during the Industrial Revolution of the eighteenth and nineteenth centuries. Goods that were once produced by artisans in relatively small numbers over relatively long periods of time were produced in factories following industrialization.[5] This meant that more-skilled workers were replaced by less-skilled workers, who because of the introduction of interchangeable parts and other production techniques could perform their tasks efficiently with little training. The demand for low-skilled workers, then, increased during this period, demonstrating that not all technological innovations are necessarily "skill-biased." Some, in fact, have been "skill-replacing."

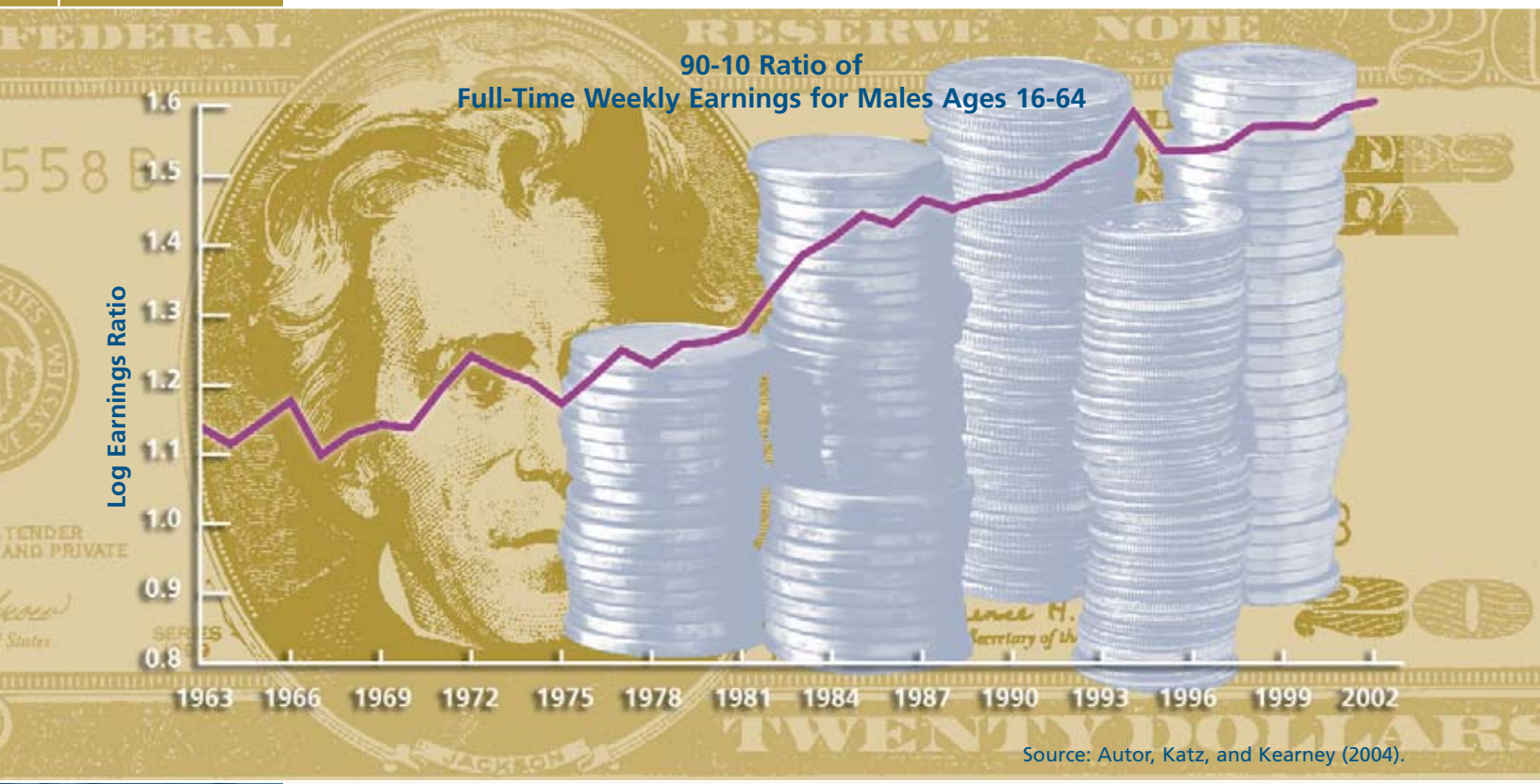
That brings us to the last half of the twentieth century. In particular, we will focus on the period from 1970 onward. As stated earlier, this has been a period of growing wage inequality. Consider the following observations.[6]

- The 90-10 weekly wage ratio, which compares the wages of workers at the 90th and 10th percentiles of the wage distribution, rose from 1.20 to 1.55 for males and from 1.05 to 1.40 for females from 1965 to 1995. Similar growth in inequality was found elsewhere in the wage distribution, though dispersion in the lower wage groups (for instance, the 50-10 ratio) seems to have stabilized recently.

- Average and median real wages have changed little since the mid-1970s. But real wages in the bottom 10 percent of the wage distribution fell sharply during much of this period before experiencing modest growth recently. Meanwhile, the real wages of those at the top of the distribution, especially the top 1 percent, have risen sharply.

- The returns gained from education fell in the 1970s, but have increased since. The college wage premium—defined as the ratio between the average weekly wage of a college graduate and a worker with a high school diploma or less—was 1.35 in 1975, 1.5 in 1985, and 1.7 in 1995.

- The returns from experience also grew in the 1970s and the 1980s but flattened in the 1990s. For instance, the ratio of weekly wages between workers with 25 years of experience and workers with five years of experience increased from 1.3 in 1970 to 1.5 in 1995.



Source: Autor, Katz, and Kearney (2004).

- The returns from white-collar occupations relative to blue-collar occupations increased by about 20 percent from 1970 to 1995.

- Inequality across race and gender has declined since 1970. The black-white differential and the male-female differential have both dropped. Also, labor force participation of women increased dramatically during this period.

> **"The evidence strongly suggests that there has been skill-biased technical change that has benefited more-skilled workers over the past 30 years."**

The last three points all involve "between-group" comparisons—that is, comparisons of workers classified by observable characteristics, such as education, experience, occupation, race, and gender. But it is also true that wage inequality "within groups"—that is, among workers with similar education or experience, for instance—has risen. This trend seems to have started about a decade prior to the trend of increasing returns from college education.[7] Looking abroad, recent trends in wage inequality in the United Kingdom tend to resemble those in the United States. Things in continental Europe are quite different, though. There has been almost no increase in wage inequality there. Indeed, wage inequality has even declined in Belgium, Germany, and Norway.

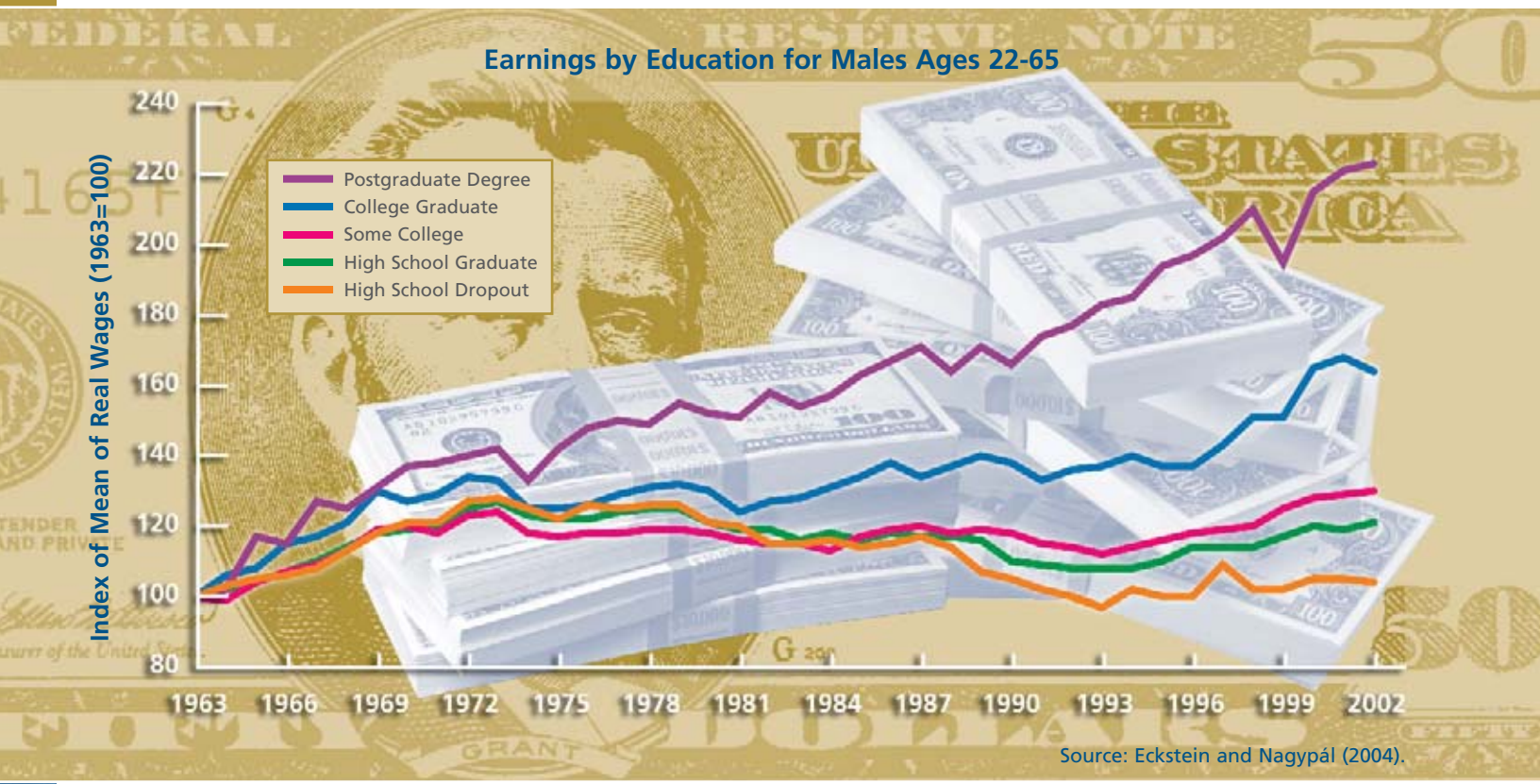
THE ARGUMENT

What is driving the increasing disparity in wages in the United States? The evidence strongly suggests that there has been skill-biased technical change that has benefited more-skilled workers over the past 30 years. By skill-biased change, we mean advancements in technology that have boosted the productivity of skilled labor relative to that of unskilled labor.

To determine why this is the case, it is important to understand that the relative wages of workers at different skill levels are determined by the relative supply of and demand for those types of workers; that supply is determined by the relative number of more-skilled and less-skilled workers; and that demand for those workers' labor is determined by the current state of technology, which in turn largely determines the productivity of different types of labor.

At first, this explanation may appear to fit awkwardly with the facts. After all, the relative supply of more-skilled workers, measured as a fraction of workers with a college education, has risen sharply during this period. Wouldn't this increased supply tend to depress wages, as seemed to happen at mid-century? Standard theory would suggest yes: with a given demand, more supply of a good

would tend to drive down its relative price. And for a while this seems to have been the case with skilled labor. During the 1970s, the number of college graduates rose sharply and effectively flooded the market, driving down the returns gained from education. But by the 1980s, more-skilled workers were able to command a wage premium.



Source: Eckstein and Nagypál (2004).

What accounts for the change? In large measure, the development of new technology. In particular, information technology, which began to make its way into the workplace in the 1970s but did not become widespread until the 1980s, the same time as the returns from skill began to increase. What is it about information or computer technology that increases the demand for skilled workers? According to David Autor, Frank Levy, and Richard Murnane, two mechanisms—substitution and complementarity—are at work:

> Computer technology substitutes for workers in performing routine tasks that can be readily described with programmed rules, while complementing workers in executing nonroutine tasks demanding flexibility, creativity, generalized problem-solving capabilities, and complex communications. As the price of computer capital fell precipitously in recent decades, these two mechanisms—substitution and complementarity—have raised relative demand for workers who hold a comparative advantage in nonroutine tasks, typically college-educated workers.[8]

Autor, Levy, and Murnane conclude that information technology can explain between 60 and 90 percent of the estimated increase in relative demand for college-educated workers from 1970 to 1998. So while the relative supply of more-skilled workers certainly increased during this period—which, all else being equal, would have tended to depress the relative wages of such workers—the demand for such labor increased even more because of technical change.

Consider a few examples that may help to illustrate their point. Advances in manufacturing, such as the introduction of computer-controlled machinery, have often meant fewer workers on the factory floor with those remaining needing a higher level of skill to operate the increasingly sophisticated equipment. A similar process is at work in the division of labor between architects and draftsmen. Before the advent of computer-aided design—or "CAD"—a draftsman would create and revise plans under the guidance of an architect. With CAD, however, the architect can easily generate and manipulate plans on the computer, resulting in the employment of fewer draftsmen, while boosting the productivity of the overall design process.

Some economists have suggested that the increasing supply of skilled workers may have actually induced the development and implementation of new technologies that require higher levels of skills. In short, as Daron Acemoglu has argued, "When developing skill-biased techniques is more profitable, new technology will tend to be skill-biased."[9] Conversely, when developing skill-replacing techniques is more profitable, new technology will tend to be skill-replacing. This, arguably, is what happened in England during the Industrial Revolution. The migration of large numbers of less-skilled workers to the English cities from rural areas and Ireland made the implementation of skill-replacing technologies profitable. "So, it may be precisely the differential changes in the relative supply of skilled and unskilled workers that explain both the presence of skill-replacing technical change in the nineteenth century and skill-biased technical change during the twentieth century."[10]

With the introduction of computer technology into the workplace, the demand for skilled workers increased along with their wages.

Thus, overall, the best explanation for the increase in wage inequality appears to be skill-biased technical change. But there are some potential challenges to this theory.

Trade between the United States and less-developed countries has increased over the last 30 years. But total trade volume arguably remains too small to have greatly affected U.S. wage patterns.

THE CHALLENGERS

Not all economists are persuaded that increasing returns from skill were the principal driver of wage inequality during the 1970s. Some have offered competing explanations, many of which are centered around institutional change.[11] One explanation, for example, is the erosion of the real value of the minimum wage and the decline in unionization in the United States. Other theories focus on globalization—specifically, increased trade with less-developed countries (LDCs) and immigration of less-skilled workers to the United States. Finally, some point to evidence from other countries. If skill-biased technical change is causing growing wage inequality in the United States, they ask, why isn't wage inequality also growing rapidly in Western Europe, since all developed countries have access to basically the same technology? We will address those issues in turn.

The nominal value of the minimum wage remained constant throughout much of the 1980s, meaning that as prices rose its real value dropped. Because the minimum wage may be expected to raise the wages of low-paid workers, the decline in its real value could be responsible for increased wage inequality.[12] There are three problems with this hypothesis, though. First, the number of U.S. workers—especially male workers—affected by the minimum wage is quite small, less than 10 percent of all workers between the ages of 18 and 65. Second, the erosion in the real value of the minimum wage occurred in the 1980s, while the *general* trend of rising wage inequality began in the 1970s. One would expect the two to coincide more closely if the decline in the real value of the minimum wage were indeed a significant factor. Third, a large share of the increase in wage inequality is due to rapid gains by workers at the top of the wage distribution. For these people, the minimum wage is not a binding constraint.

Timing is also a problem in theories that focus on declining unionization.[13] The 1950s, as we have discussed, was a time of wage compression, not growing wage inequality. Yet it was during this decade that unionization began its steady decline.

To be sure, the decline of unionization in the private sector picked up pace during the 1970s and 1980s. But at the same time, the public sector workforce became increasingly unionized, compensating for some of the loss in the private sector. In addition, wage inequality has increased quite rapidly in some sectors of the economy that were never highly unionized, such as the legal and medical professions.

There is, however, some evidence that technical change may have been partially responsible for the decline in unionization since the 1950s.[14] Such a decline could have caused the real wages of low-skilled workers to fall (a point that we will return to in the next section), but its effect on increasing wage inequality would have been only indirect, with technical change starting the whole process.

Popular opinion often attributes increased trade with LDCs as the principal cause of increasing wage inequality in the United States—an explanation that some economists have argued is consistent with the data. Indeed, standard trade theory, based on the principle of comparative advantage, would seem to predict just that. Since LDCs have relatively large numbers of unskilled workers, an increase in trade would act like an increase in the relative supply of unskilled workers in the United States, thus potentially increasing wage inequality. And trade between the United States and the developing world has indeed increased substantially during the past 30 years, the period during which wage inequality has been increasing.

The relative price of skill-intensive goods has not increased over the period of rising inequality, however, as one would have expected if trade were a significant factor in wage dispersion. Perhaps more telling, the total volume of trade with LDCs is arguably too small to have had a significant effect on U.S. wages. The effects of trade flows on "relative skill supplies have not been substantial enough to account for more than a small proportion of the overall widening of the wage structure over the past 15 years and have played only a modest role in the expansion of the college-high school wage differential in the United States," conclude George Borjas, Richard Freeman, and Lawrence Katz.[15]

> **"The total volume of trade with less-developed countries is arguably too small to have had a significant effect on U.S. wages."**

As for immigration, the total number of newcomers to the United States during the period under review also is probably too small to have had a large effect on the wage structure. For instance, during the 1970s, immigration added 2 million

new workers to the U.S. labor force. But because of the baby boom and the increased participation of women in the workplace, roughly 20 million new native workers also entered the labor force during that period. In addition, even during the 1980s, a period of relatively high immigration, the immigrant share of the total labor supply increased by only one percentage point, from seven to eight percent. "These magnitudes can be taken to mean that immigration is unlikely to have large effects on the overall distribution of wages," concludes Robert Topel.[16]

Finally, some have argued that if technical change is a significant cause of wage inequality, then it ought to have affected the wage structure in Western Europe in the same way that it has in the United States, since those countries have access to much of the same technology and arguably employ it in similar ways to American firms. But, as we know, wage inequality has not increased as rapidly in Western Europe as it has in the United States. Does this cause significant problems for the skill-biased technical change explanation of wage inequality? Some have suggested so. We think otherwise, however. The observations from Western Europe can be explained by factors that do not contradict the skill-biased technical change argument.

As many commentators have noted, Western Europe has significantly less flexible labor market policies than the United States, including more comprehensive employment protection, longer and more generous unemployment benefits, and greater restrictions on wage bargaining. Those policies likely have had the effect of compressing wages. Thus, while similar technical change may have been introduced at roughly the same time in the United States and Europe, different labor market policies have resulted in different effects on the respective wage structures.[17]

In addition, Europe's labor market policies combined with rapid technological change arguably have led to greater unemployment. In the 1960s, the United States and Europe had roughly the same unemployment rates. Since then, Europe's labor market policies have not changed substantially—those policies have been restrictive for many decades—but its unemployment rate has risen sharply. Why?

Strict employment-protection laws make it difficult for companies to terminate workers in Europe. But over time some workers will leave voluntarily, perhaps encouraged by generous social-welfare benefits. Those workers' skills become dated quickly as technology changes, just as they do for unemployed workers in the United States. But the principal difference is that the strict European employment-protection laws that made those same workers difficult to terminate in the first place also have the effect of keeping them out of the workforce longer than they would have been otherwise. Employers, knowing that all new hires are

possibly lifelong employees, will look very carefully for a good match. Those workers whose skills are not up-to-date will have difficulty finding new employment. And the longer they are out of work, the more difficulty they will have, because multiple generations of technology will have been introduced and replaced during their absence from the workforce. Also, the generous welfare benefits those workers receive reduce their incentives to acquire new skills on their own.

In the United States, where it is easier to terminate workers, employers do not have to be as careful when hiring new employees. The cost of taking a chance on a worker whose skills may be somewhat dated is potentially much smaller than in Europe. As a result, the U.S. unemployment rate has not risen steadily over the past 30 years, as it has in most European states.[18]

By the mid-1980s, production processes were highly automated and personal computers were commonplace.

THE PROBLEMS

We have argued that the most compelling single explanation for the rise of wage inequality in the United States since the 1970s has been skill-biased technical change. In addition, we have argued that other proposed explanations—such as institutional change and globalization—do not appear very persuasive. Yet there remain two unresolved issues.

First, as we previously noted, the growth of wage inequality within groups, sometimes referred to as "residual inequality," is quite large and may not be adequately explained by skill-biased technical change alone. Second, and also mentioned earlier, real wages for those at the lowest end of the distribution declined during much of the last 30 years. Yet, as Acemoglu has argued, it is unclear how "sustained technological change can be associated with *an extended period* of falling wages of low-skill workers."[19] How can these developments be explained?

Perhaps the most compelling explanation for the increase in residual inequality is that there are unmeasured differences in the skills among workers within groups. Consider, for example, two economists that have nearly identical profiles: both are 50-year-old, white males; hold graduate degrees from similar institutions; and have worked as university professors for 20 years. To an outside observer, it is impossible to distinguish between the two workers. But to their colleagues and students, there may be very substantial differences. One economist simply may have more natural talent than the other, producing innovative research across a number of fields. Or he may be a more gifted teacher who inspires students in the classroom. In either case, he is a more valuable worker than his counterpart and consequently may receive a higher wage. We should not be surprised by such a wage differential, but according to our measures of worker characteristics, both economists fall into the same group—thus leading to an increase in residual inequality. Skill-biased technical change increases the premium paid to skilled workers, even if skills are not well-measured by such characteristics as education or experience.

Unmeasured differences in skill between workers with similar demographic profiles are largely responsible for the growth in residual inequality.

Also, rising residual wage inequality may be possible even without unmeasured skill differences. One possible explanation of this phenomenon involves the role of vintage capital. Close examination of the data suggests that the pace of technological advancement has been accelerating since the mid-1970s. Yet different firms have adopted new technologies at different times and at different levels; that is, firms employ technologies of different vintages. This has important implications for the wage structure. In a model that includes labor market frictions—meaning that the labor market is not fully competitive because, for instance, it is costly to switch jobs—workers with the same skills can be expected to earn different wages. More specifically, their wages will increase as the productivity of

the technology with which they are working increases. As a result, it is plausible that technological acceleration may increase wage dispersion within groups, since with more rapid technical change you have more vintages of technology in operation simultaneously.

But what about the drop in real wages of less-skilled workers? In a world of relatively slow technical change, many skills are easily transferable. Workers can move from one company to another with little trouble adapting to the machinery at their new firm. In a world of rapid and accelerating technological change, however, such moves are more difficult since fewer skills are transferable. Upon separation—that is, when workers leave a firm—those workers can expect to suffer wage losses. This scenario is especially true of workers who have been using the oldest technology, because they find that the skills they have acquired through experience are even *more* outdated than those of workers in similar industries who have been exposed to more modern technology. Thus, accelerating technological change may help us explain both the rise in residual inequality and the decline in real wages at the bottom of the distribution.[20]

> **"Skill-biased technical change increases the premium paid to skilled workers, even if skills are not well-measured by such characteristics as education or experience."**

It is important to note, though, that such conclusions are only tentative. Whereas there seems to be overwhelming evidence and an emerging consensus about the role of skill-biased technical change on the wage structure, there remains a good deal of uncertainty about the cause(s) of residual inequality and the declining real wages of less-skilled workers.

IMPLICATIONS FOR PUBLIC POLICY

What lessons should policymakers draw from our discussion of the causes of wage inequality in the United States? We might start with a general principle that is often associated with the medical profession but is applicable to public policy as well: first, do no harm. There is understandably a great deal of anxiety among the public about the changing nature of the American economy. Those forces which create economic growth for us all also cause disruptions for some.[21] As Joseph Schumpeter famously noted, capitalism is characterized by "the perennial gale of creative destruction."[22] And to many people, that gale—at least for the moment—is associated with globalization.

Yet, as we have argued, increased trade with LDCs and immigration from abroad likely have had little effect on wage inequality, while almost certainly adding to the strength and vitality of the American economy.[23] Efforts to slow the growth of foreign goods or labor coming to our shores would be costly to Americans as a whole, as well as to those people who seem to be hurt by globalization at the present. As Jeffrey Sachs and Howard Shatz have written, "U.S. labor market experience … teaches that the labor force will respond to the premium on education by increasing the investment in education, thereby narrowing the gap in inequality in the future."[24] Insofar as barriers aimed to slow globalization dampen the incentive to build skills, those barriers will tend to perpetuate wage inequality.

In addition, we should be wary of proposals to extend the duration of or expand the generosity of unemployment insurance benefits to those workers who have lost their jobs due to technical change. Such proposals would tend to increase the time that displaced workers remain unemployed. Instead, we ought to encourage those workers to reenter the labor force as quickly as possible. The problem, of course, is that the jobs that such workers will be able to secure will likely pay significantly less than their former positions. "Workers not only lose income when they are unemployed, but many often suffer a drop in their earnings after finding new jobs. Older workers—who tend to be less flexible adapting to new production techniques or who lack the educational background to transfer to well-paid service economy jobs—bear the greatest losses," write Lori Kletzer and Robert Litan.[25]

> **"The evidence seems increasingly clear that there is a relatively high level of return on investments in education early in life."**

An alternative way to assist displaced workers may be a simple transfer program that subsidizes their wages upon reemployment.[26] This policy would boost recipients' incomes, while allowing them to allocate their financial resources toward the mix of training opportunities and general consumption they deem most beneficial. Such a program would certainly have problems of its own, and policymakers would need to implement it in a way that would minimize distortions to labor market conditions as much as possible. As we noted earlier, in the case of Europe, government involvement in the labor market often can have undesirable effects.

Perhaps an even more promising option would be to increase public investment in skill acquisition. As we have argued, the principal factor driving wage inequality is skill-biased technical change. Thus, the most direct and arguably most effective way to reduce such inequality would be to reduce the disparity in skills between workers.

Investments in skill acquisition early in life may lead to a reduction in wage inequality.

What type of skills should we attempt to provide through public investment? The evidence seems increasingly clear that there is a relatively high level of return on investments in education early in life. As Pedro Carneiro and James Heckman write, "Skill and ability beget future skill and ability."[27] Also, we might expect those investments to yield larger benefits if they are directed toward broadly generalizable skills. The ability to think critically, for instance, is crucial to analyzing and adapting to a number of situations. In contrast, the return on educational investments later in life, especially remedial education or compensatory investments, tend to be smaller. This is true for at least two reasons. First, without a basic level of knowledge on which to build, it will be difficult for individuals to effectively acquire new skills. Second, by definition, older workers have less time to recoup the investment in education than younger workers.

While this may make perfect sense analytically, it still may be difficult to accept. Such reasoning implies that the people hurting the most now—those who have been displaced from their jobs—may also have the most trouble building their skills. What should we do to help those people? A good argument could be made that the government should act as a clearinghouse of information about job training programs, though we should be cautious about expanding such training programs given their limited success.[28] Similarly, we should be skeptical about providing greater financial assistance to displaced workers seeking education at community colleges and four-year institutions. There are already numerous educational subsidies in place, which have substantially reduced potential credit constraints for low- and middle-income people.[29]

Still, increased investment in skill acquisition is a policy option worth significant consideration. If done properly, it may be an effective tool in reducing wage inequality and could yield additional benefits to the economy, such as increasing workers' productivity.

CONCLUSION

Wage inequality in the United States is large and has been growing during the past 30 years. The main cause, it appears, is skill-biased technical change. Those workers with high skill levels have experienced more rapid wage growth than less-skilled workers, some of whom have seen an actual decline in their real wages.

This development is cause for concern to many people who fear that a large share of the workforce no longer has a reasonable chance of achieving its goals, monetary and otherwise. Such concern is understandable. Indeed, the evidence suggests that, at present, less-skilled workers face formidable challenges in the labor market. As a society, we ought to consider investing more funds in skill development—especially early skill development—to ensure that as many people as possible have the basic tools necessary to succeed.

But we also need to remember that technical change is not necessarily skill-biased. There have been significant episodes where technical innovation appears to have been skill-replacing. From today's vantage point, it seems unlikely that we will return to such a world, but developments may lead us in that direction. Market economies, though highly efficient, often move in surprising and unpredictable directions.

Source: DeLong (2000).

Perhaps most important, we ought to focus not just on the distributional effects of technical change—important as they may be—but also on aggregate well-being. Technical change has fueled much of the economic growth of the past two centuries and raised living standards to levels once unimaginable.

J. Bradford DeLong has calculated that real GDP per worker grew from roughly $13,700 in 1890 to about $65,000 in 2000. That's nearly a five-fold increase. And as DeLong has noted, that significantly understates our improvement in living standards. In 1890, people "could not buy modern entertainment or communications or transportation technologies." There were "no modern appliances, no modern buildings, no antibiotics, no air travel. An income of $13,700 today that must be spent exclusively on commodities already in use in the late 19th century is, for all of us, worth a lot less than $13,700."[30]

"Despite the pain that technological change can cause workers in certain segments of the labor force, we should remember that, on net, technical change is good for the economy and good for people."

It's useful to consider the alternative to embracing technology. By 1400, China had invented many of the technologies that triggered the Industrial Revolution of the eighteenth century, such as moveable-type printing, the water-powered spinning machine, and the blast furnace. Tight state controls impeded the spread of those technologies, however, preventing them from being used to their full potential and inhibiting further innovation.[31] We are not suggesting that others are seriously proposing blocking the development and distribution of new technologies in the United States as China did centuries ago. But we do think it is important to understand how powerful a force technology can be for human well-being—and how counterproductive it can be to curtail its growth.

Despite the pain that technological change can cause workers in certain segments of the labor force, we should remember that, on net, technical change is good for the economy and good for people. We should not discourage or lament it.

Andreas Hornstein, Tom Humphrey, Ned Prescott, John Walter, and Alice Felmlee contributed valuable comments to this article.

ENDNOTES

1. For an exception, see Lerman (1997).
2. Goldin and Katz (1999), p. 9.
3. Goldin and Margo (1992).
4. The National War Labor Board was created in 1942 in an effort to stabilize wages during World War II. According to two authors who worked at the agency, "no changes in wage rates could be made except upon approval of the National War Labor Board; and … the Board could approve wage increases only on four narrowly circumscribed grounds, and wage decreases on only two grounds." See Henig and Unterberger (1945), pp. 319–20.
5. For more on the introduction of new technology in England during the Industrial Revolution, see Mokyr (1994).
6. These observations are taken from Hornstein, Krusell, and Violante (2004), which surveys empirical work up to 1995. Recently, Eckstein and Nagypál (2004) and Autor, Katz, and Kearney (2004) have updated some of these observations. Instances in which the more recent observations differ from the older observations are noted in the text.
7. Juhn, Murphy, and Pierce (1993), p. 412.
8. Autor, Levy, and Murnane (2003), p. 1322.
9. Acemoglu (2002), p. 9.
10. Ibid., p. 12. Also, see Acemoglu (1998).
11. See, for instance, Card and DiNardo (2002).
12. Lee (1999) argues that this has, in fact, occurred.
13. For a recent paper that argues there is a significant relationship between unionization and wage inequality, see Card, Lemieux, and Riddell (2003).
14. See Acemoglu, Aghion, and Violante (2001).
15. Borjas, Freeman, and Katz (1997), p. 67.
16. Topel (1997), p. 62.
17. See Krugman (1994).
18. For a complementary explanation, see Ljungqvist and Sargent (1998).
19. Acemoglu (2002), p. 13.
20. This section draws on Violante (2002).
21. Fears about the effect of technical change on the job market—in particular, the belief that technical innovation is a net destroyer of jobs—are not new. David Ricardo and other classical economists addressed the issue. See Humphrey (2004).
22. Schumpeter (1942).
23. See Burtless, Lawrence, Litan, and Shapiro (1998) for a discussion of the benefits of open trade. See Simon (1999) for a discussion of the benefits of liberal immigration policies.
24. Sachs and Shatz (1996), p. 239.
25. Kletzer and Litan (2001), p. 2.
26. Kletzer and Litan outline such a proposal that would work as follows. Once displaced workers found new jobs, they would receive a subsidy to increase their current lower wage to a level more closely approximating their former higher wage. The wage subsidy would be available for only a limited period of time following reemployment and there would be an annual cap on payments. Ibid., p. 4.
27. Carneiro and Heckman (2003).
28. See Kletzer (1998), pp. 131–33.
29. See Carneiro and Heckman (2002).
30. DeLong (2000), pp. 14–15.
31. See Landes (1998), especially pp. 51–59.

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FEDERAL RESERVE BANK OF RICHMOND BOARD OF DIRECTORS

CHAIRMAN

Wesley S. Williams, Jr.
Partner
Covington & Burling
Washington, D.C.

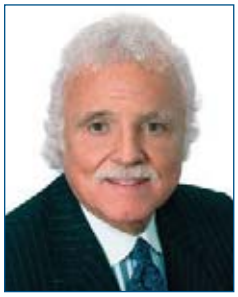
Our Federal Reserve Bank of Richmond Board of Directors, along with our boards at our Baltimore and Charlotte Offices, provide invaluable guidance and support in the formulation of monetary policy and the oversight of Bank operations. In recent years, they have moved toward more active involvement in governance following a trend throughout corporate America in response to the Sarbanes-Oxley Act of 2002. We acknowledge our directors, particularly our Richmond Board under the leadership of Chairman Wes Williams, for their continued dedication and increased responsibility in helping us to excel for our Fifth District constituents and within the Federal Reserve System in 2004.

By providing timely business and economic information about conditions in the District, our directors provide the Bank president with first-hand perspectives for use in the formulation of effective monetary policy. Understanding the value of this responsibility, Williams believes "it is highly important for us to be on top of the many voices that give us insights into the operation of the economy and the state of things." Our Richmond Board also recommends changes in the discount rate for approval by the Board of Governors, further representing the private sector in the policymaking process.

Our boards of directors also actively provide governance leadership and support for all Bank operations. Our nine-member Richmond Board is responsible for the soundness of our internal audits and provides oversight on all budgetary matters. In keeping with their general responsibility for appointing the Bank president, first vice president, and officers, this year the directors conducted a national search that led to the appointment of Jeff Lacker as our new president.

We are especially grateful to those members of our boards of directors and our Federal Advisory Council Representative whose terms ended in 2004.

Wesley S. Williams, Jr.; Eddie Canterbury; and ***Joe Edens*** from our Richmond Board
Owen E. Herrnstadt from our Baltimore Board
James F. Goodmon and ***William H. Nock*** from our Charlotte Board
Fred L. Green, III, Federal Advisory Council Representative



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Synovus Financial Corp.

Chairman

The National Bank of South Carolina
Columbia, South Carolina

Six members of our Richmond Board are elected by banks in the Fifth District that are members of the Federal Reserve System, and the remaining three are appointed by the Board of Governors.

The Richmond Board also annually appoints the District's representative to the Federal Advisory Council, which consists of one member from each of the Federal Reserve Districts. The Council confers four times a year with the Board of Governors on business conditions and issues related to the banking industry.

Our Baltimore and Charlotte Offices have seven-member boards that oversee operations at their respective offices and, like our Richmond Board, contribute to policymaking and provide timely business and economic information. Four directors on each of these boards are appointed by the Richmond directors and three are appointed by the Board of Governors.

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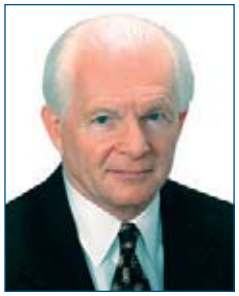

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Established in 1985, the Small Business and Agriculture Advisory Council advises the Bank president and other senior officers on the impact that monetary, banking, and fiscal policies have on the District's small business and agricultural sectors. The Council's 12 members are appointed by the Bank's president.

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South Carolina Association of Community Development Corporations
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SunTrust Bank
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The Bank organized the Community Development Advisory Council in 1998 to enhance communication between the Bank and the public concerning community development issues. The eight-member Council provides counsel to the Bank president and other senior officers on community development concerns and related policy matters. Council members are appointed by the Bank's president.

The Operations Advisory Committee was established by the Bank in 1978 to serve as a forum for communication with financial institutions about the Federal Reserve's financial services and to help the Bank respond to the changing needs of its banking constituency. Committee members are appointed by the Bank's first vice president.

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James T. Riffe
Executive Vice President and Chief Operating Officer
Highlands Union Bank
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Vice President Operations and Service Delivery
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Terry Childress
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President and Chief Executive Officer
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Gerald McQuaid
Senior Vice President and Division Executive
Bank Operations
Chevy Chase Bank, FSB
Laurel, Maryland

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Michael A. Tucker
President and Chief Executive Officer
West Virginia Central Credit Union
Parkersburg,
West Virginia

MESSAGE FROM MANAGEMENT

For the Federal Reserve Bank of Richmond, 2004 was a year of transition, a time when a series of anticipated changes in organization and operations occurred. With the departure of a president and the conclusion of a retirement program involving a large number of officers and staff, the Bank lost a great deal of valuable knowledge and experience. At the same time, a new face of the Bank began to emerge, with the succession of experienced leaders at all levels who demonstrate a strong commitment to our core values.

MANAGEMENT COMMITTEE
(SEATED, LEFT TO RIGHT)
James McAfee
Claudia N. MacSwain
Malcolm C. Alfriend
Walter A. Varvel
Victor M. Brugh, II
Robert E. Wetzel, Jr.
Janice E. Clatterbuck

(STANDING, LEFT TO RIGHT)
Marvin S. Goodfriend
Jeffrey S. Kane
Jeffrey M. Lacker
Marsha S. Shuler

In August, Al Broaddus retired after 11 years as the Bank's president. We are indebted to Al for his leadership and service and will miss his inspiring example. To succeed him as president, our board appointed Jeff Lacker, an economist with the Bank for 15 years and director of the Research Department for the last five years. We welcome Jeff to his new role and look forward to his energy and vision for the Bank's future. More than 200 longtime employees left the Bank in 2004 as part of a planned retirement program. In preparation for this change, the Bank several years ago initiated leadership development efforts that identified future leaders and prepared them to take on additional responsibilities. In conjunction with these changes in leadership, Bank management completed a restructuring and realignment of its responsibilities to better reflect the direction we want to move as a Bank.

The growth and increased complexity of the banking industry in the Fifth District has presented the Bank with greater challenges as well as expanded opportunities to continue fulfilling our responsibilities in our daily interactions with financial organizations and markets. Banking supervisors, research economists, and other practitioners are working more closely on projects and are building a competency of increased information sharing and collaboration throughout the Bank. Operations of the new Federal Reserve System functions hosted by the Bank continued to mature during the year, with the National Procurement Office developing System-wide purchasing standards and the centralized payroll function absorbing payroll responsibility for seven additional Reserve Banks.

In other business changes, the consolidation of our District check services was completed and resulted in the closing of operations in Richmond; Columbia, South Carolina; and Charleston, West Virginia, with our Baltimore and Charlotte Offices growing to assume most of that work. The Charleston responsibilities were transferred to the Cincinnati Office of the Cleveland Fed. We also introduced new check services to support the requirements of the Check 21 legislation.

Our vision—to be a Bank of excellence, making important contributions to the System—led us to undertake initiatives to be more agile and able to adapt to changing conditions in the industry and the larger economy. By drawing on broader and more diverse input from around the Bank, our outlook is more inclusive, the information we use is more relevant, and the decisions we make are more timely. We are fulfilling our responsibility to the System to have the people in place who can recognize and seize opportunities that allow the Bank to meet and excel at our challenges.

In a broad sense, we have sought to integrate "thought leadership" with our strategic goals—to employ the best people, work effectively, exert influence on monetary policy, engage constructively with the District's people and businesses, and find ways to play important roles in the System. As we look ahead, we believe we have a strong and solid base of experience upon which to build as we seek to capitalize on the insights of our new and talented leadership and inspire Bank employees to excel at all they do and to help make meaningful contributions to the Federal Reserve.

Walter A. Varvel

Walter A. Varvel
First Vice President

OFFICERS

Jeffrey M. Lacker
President

Walter A. Varvel
First Vice President

Malcolm C. Alfriend
Senior Vice President

Victor M. Brugh, II
Medical Director

Janice E. Clatterbuck
Senior Vice President

Marvin S. Goodfriend
Senior Vice President and Policy Advisor

Claudia N. MacSwain
Senior Vice President and Chief Financial Officer

James McAfee
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Marsha S. Shuler
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Robert E. Wetzel, Jr.
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William A. Bridenstine, Jr.
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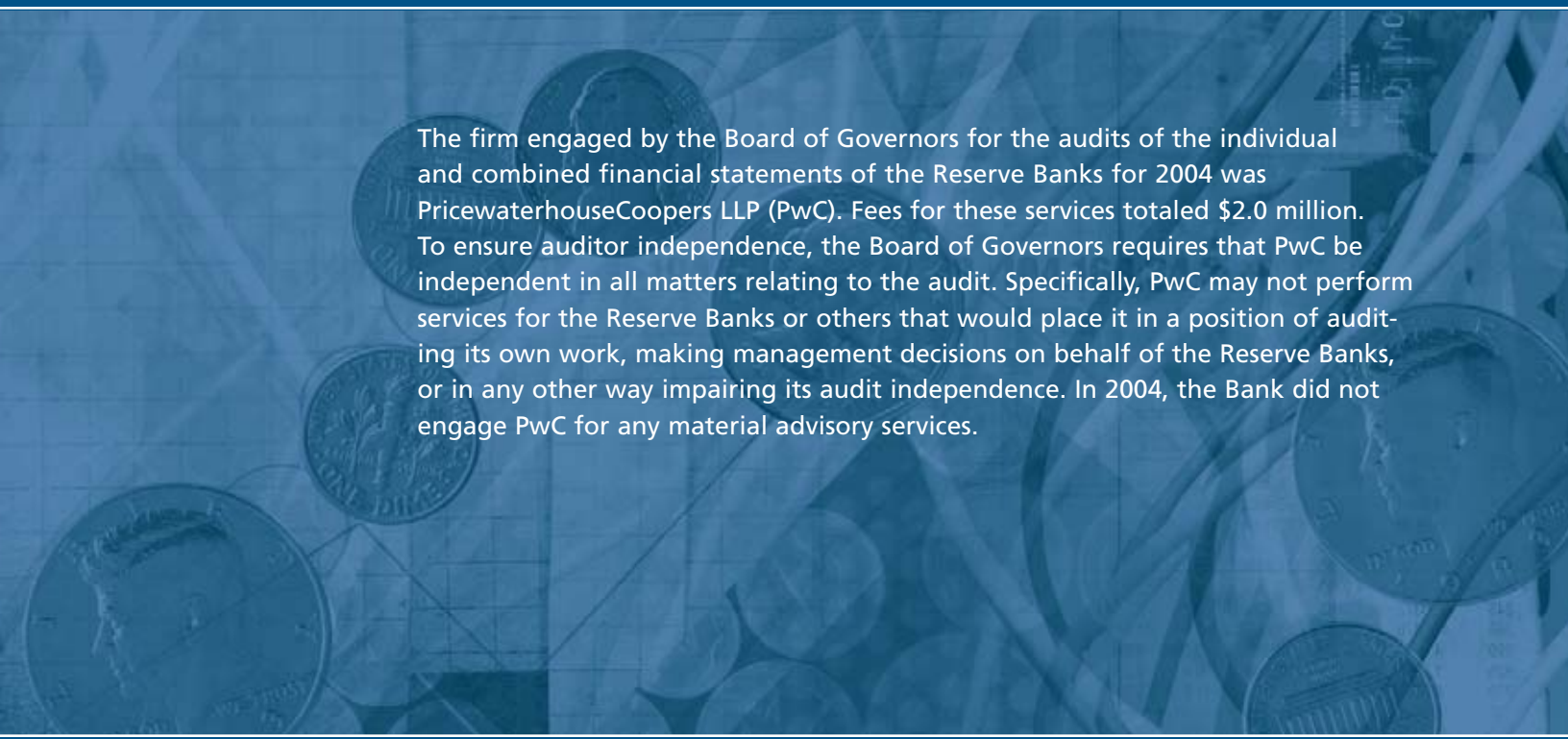
Terry J. Wright
Assistant Vice President

Listing as of December 31, 2004

FINANCIAL STATEMENTS



The firm engaged by the Board of Governors for the audits of the individual and combined financial statements of the Reserve Banks for 2004 was PricewaterhouseCoopers LLP (PwC). Fees for these services totaled $2.0 million. To ensure auditor independence, the Board of Governors requires that PwC be independent in all matters relating to the audit. Specifically, PwC may not perform services for the Reserve Banks or others that would place it in a position of auditing its own work, making management decisions on behalf of the Reserve Banks, or in any other way impairing its audit independence. In 2004, the Bank did not engage PwC for any material advisory services.

MANAGEMENT ASSERTION

MARCH 10, 2005

To the Board of Directors:

The management of the Federal Reserve Bank of Richmond ("FRB Richmond") is responsible for the preparation and fair presentation of the Statement of Financial Condition, Statement of Income, and Statement of Changes in Capital as of December 31, 2004 (the "Financial Statements"). The Financial Statements have been prepared in conformity with the accounting principles, policies, and practices established by the Board of Governors of the Federal Reserve System and as set forth in the Financial Accounting Manual for the Federal Reserve Banks ("Manual"), and as such, include amounts, some of which are based on judgments and estimates of management. To our knowledge, the Financial Statements are, in all material respects, fairly presented in conformity with the accounting principles, policies and practices documented in the Manual and include all disclosures necessary for such fair presentation.

The management of the FRB Richmond is responsible for maintaining an effective process of internal controls over financial reporting including the safeguarding of assets as they relate to the Financial Statements. Such internal controls are designed to provide reasonable assurance to management and to the Board of Directors regarding the preparation of reliable Financial Statements. This process of internal controls contains self-monitoring mechanisms, including, but not limited to, divisions of responsibility and a code of conduct. Once identified, any material deficiencies in the process of internal controls are reported to management, and appropriate corrective measures are implemented.

Even an effective process of internal controls, no matter how well designed, has inherent limitations, including the possibility of human error, and therefore can provide only reasonable assurance with respect to the preparation of reliable financial statements.

The management of the FRB Richmond assessed its process of internal controls over financial reporting including the safeguarding of assets reflected in the Financial Statements, based upon the criteria established in the "Internal Control–Integrated Framework" issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on this assessment, we believe that the FRB Richmond maintained an effective process of internal controls over financial reporting including the safeguarding of assets as they relate to the Financial Statements.

Federal Reserve Bank of Richmond

Jeffrey M. Lacker
President

Walter A. Varvel
First Vice President

Claudia N. MacSwain
Senior Vice President and
Chief Financial Officer

REPORT OF INDEPENDENT ACCOUNTANTS

To the Board of Directors of the Federal Reserve Bank of Richmond:

We have examined management's assertion, included in the accompanying Management Assertion, that the Federal Reserve Bank of Richmond ("FRB Richmond") maintained effective internal control over financial reporting and the safeguarding of assets as they relate to the financial statements as of December 31, 2004, based on criteria established in *Internal Control–Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission. FRB Richmond's management is responsible for maintaining effective internal control over financial reporting and safeguarding of assets as they relate to the financial statements. Our responsibility is to express an opinion on management's assertion based on our examination.

Our examination was conducted in accordance with attestation standards established by the American Institute of Certified Public Accountants and, accordingly, included obtaining an understanding of internal control over financial reporting, testing and evaluating the design and operating effectiveness of internal control, and performing such other procedures as we considered necessary in the circumstances. We believe that our examination provides a reasonable basis for our opinion.

Because of inherent limitations in any internal control, misstatements due to error or fraud may occur and not be detected. Also, projections of any evaluation of internal control over financial reporting to future periods are subject to the risk that the internal control may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

In our opinion, management's assertion that FRB Richmond maintained effective internal control over financial reporting and over the safeguarding of assets as they relate to the financial statements as of December 31, 2004 is fairly stated, in all material respects, based on criteria established in *Internal Control–Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

This report is intended solely for the information and use of management and the Board of Directors and Audit Committee of FRB Richmond, and any organization with legally defined oversight responsibilities and is not intended to be and should not be used by anyone other than these specified parties.

PricewaterhouseCoopers LLP

MARCH 16, 2005

REPORT OF INDEPENDENT AUDITORS

To the Board of Governors of the Federal Reserve System and the Board of Directors of the Federal Reserve Bank of Richmond:

We have audited the accompanying statements of condition of the Federal Reserve Bank of Richmond (the "Bank") as of December 31, 2004 and 2003, and the related statements of income and changes in capital for the years then ended, which have been prepared in conformity with the accounting principles, policies, and practices established by the Board of Governors of the Federal Reserve System. These financial statements are the responsibility of the Bank's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

As described in Note 3, these financial statements were prepared in conformity with the accounting principles, policies, and practices established by the Board of Governors of the Federal Reserve System. These principles, policies, and practices, which were designed to meet the specialized accounting and reporting needs of the Federal Reserve System, are set forth in the *Financial Accounting Manual for Federal Reserve Banks* and constitute a comprehensive basis of accounting other than accounting principles generally accepted in the United States of America.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the Bank as of December 31, 2004 and 2003, and results of its operations for the years then ended, on the basis of accounting described in Note 3.

PricewaterhouseCoopers LLP

MARCH 16, 2005

STATEMENTS OF CONDITION (in millions)

As of December 31,	2004	2003
ASSETS		
Gold certificates	$ 819	$ 808
Special drawing rights certificates	147	147
Coin	62	83
Items in process of collection	341	714
U.S. government securities, net	55,147	51,954
Investments denominated in foreign currencies	5,009	4,915
Accrued interest receivable	386	388
Interdistrict settlement account	—	2,793
Bank premises and equipment, net	252	267
Other assets	125	118
Total assets	**$62,288**	$62,187
LIABILITIES AND CAPITAL		
Liabilities:		
Federal Reserve notes outstanding, net	52,716	50,094
Securities sold under agreements to repurchase	2,340	1,973
Deposits:		
Depository institutions	1,645	5,087
Other deposits	71	69
Deferred credit items	544	628
Interest on Federal Reserve notes due U.S. Treasury	101	44
Interdistrict settlement account	420	—
Accrued benefit costs	91	99
Other liabilities	64	45
Total liabilities	**57,992**	58,039
Capital:		
Capital paid-in	2,148	2,074
Surplus	2,148	2,074
Total capital	**4,296**	4,148
Total liabilities and capital	**$62,288**	$62,187

The accompanying notes are an integral part of these financial statements.

STATEMENTS OF INCOME (in millions)

For the years ended December 31,	2004	2003
INTEREST INCOME		
Interest on U.S. government securities	$1,677	$1,722
Interest on investments denominated in foreign currencies	63	64
Total interest income	1,740	1,786
INTEREST EXPENSE		
Interest expense on securities sold under agreements to repurchase	23	16
Net interest income	1,717	1,770
OTHER OPERATING INCOME		
Income from services	66	72
Reimbursable services to government agencies	32	35
Foreign currency gains, net	289	666
Other income	5	5
Total other operating income	392	778
OPERATING EXPENSES		
Salaries and other benefits	215	232
Occupancy expense	32	30
Equipment expense	88	84
Assessments by Board of Governors	102	110
Other credits	(121)	(113)
Total operating expenses	316	343
Net income prior to distribution	$1,793	$2,205
DISTRIBUTION OF NET INCOME		
Dividends paid to member banks	$ 125	$ 125
Transferred to surplus	74	1
Payments to U.S. Treasury as interest on Federal Reserve notes	1,594	2,079
Total distribution	$1,793	$2,205

The accompanying notes are an integral part of these financial statements.

STATEMENTS OF CHANGES IN CAPITAL (in millions)

For the years ended December 31, 2004 and December 31, 2003	Capital Paid-in	Surplus	Total Capital
Balance at January 1, 2003 (41.5 million shares)	$2,073	$2,073	$4,146
Transferred to surplus	—	1	1
Net change in capital stock issued (.01 million shares)	1	—	1
Balance at December 31, 2003 (41.5 million shares)	$2,074	$2,074	$4,148
Transferred to surplus	—	74	74
Net change in capital stock issued (1.5 million shares)	74	—	74
Balance at December 31, 2004 (43.0 million shares)	**$2,148**	**$2,148**	**$4,296**

The accompanying notes are an integral part of these financial statements.

NOTES TO FINANCIAL STATEMENTS

1. STRUCTURE

The Federal Reserve Bank of Richmond ("Bank") is part of the Federal Reserve System ("System") created by Congress under the Federal Reserve Act of 1913 ("Federal Reserve Act") which established the central bank of the United States. The System consists of the Board of Governors of the Federal Reserve System ("Board of Governors") and twelve Federal Reserve Banks ("Reserve Banks"). The Reserve Banks are chartered by the federal government and possess a unique set of governmental, corporate, and central bank characteristics. The Bank and its branches in Baltimore, Maryland, and Charlotte, North Carolina serve the Fifth Federal Reserve District, which includes Maryland, North Carolina, South Carolina, Virginia, District of Columbia, and portions of West Virginia. Other major elements of the System are the Federal Open Market Committee ("FOMC") and the Federal Advisory Council. The FOMC is composed of members of the Board of Governors, the president of the Federal Reserve Bank of New York ("FRBNY"), and, on a rotating basis, four other Reserve Bank presidents. Banks that are members of the System include all national banks and any state-chartered bank that applies and is approved for membership in the System.

Board of Directors

In accordance with the Federal Reserve Act, supervision and control of the Bank are exercised by a Board of Directors. The Federal Reserve Act specifies the composition of the Board of Directors for each of the Reserve Banks. Each board is composed of nine members serving three-year terms: three directors, including those designated as Chairman and Deputy Chairman, are appointed by the Board of Governors, and six directors are elected by member banks. Of the six elected by member banks, three represent the public and three represent member banks. Member banks are divided into three classes according to size. Member banks in each class elect one director representing member banks and one representing the public. In any election of directors, each member bank receives one vote, regardless of the number of shares of Reserve Bank stock it holds.

2. OPERATIONS AND SERVICES

The System performs a variety of services and operations. Functions include formulating and conducting monetary policy; participating actively in the payments mechanism, including large-dollar transfers of funds, automated clearinghouse ("ACH") operations, and check processing; distributing coin and currency; performing fiscal agency functions for the U.S. Treasury and certain federal agencies; serving as the federal government's bank; providing short-term loans to depository institutions; serving the consumer and the community by providing educational materials and information regarding consumer laws; supervising bank holding companies and state member banks; and administering other regulations of the Board of Governors. The Board of Governors' operating costs are funded through assessments on the Reserve Banks.

The FOMC establishes policy regarding open market operations, oversees these operations, and issues authorizations and directives to the FRBNY for its execution of transactions. Authorized transaction types include direct purchase and sale of securities, the purchase of securities under agreements to resell, the sale of securities under agreements to repurchase, and the lending of U.S. government securities. The FRBNY is also authorized by the FOMC to hold balances of, and to execute spot and forward foreign exchange ("F/X") and securities contracts in, nine foreign currencies and to invest such foreign currency holdings ensuring adequate liquidity is maintained. In addition, FRBNY is authorized to maintain reciprocal currency arrangements ("F/X swaps") with various central banks, and "warehouse" foreign currencies for the U.S. Treasury and Exchange Stabilization Fund ("ESF") through the Reserve Banks.

3. SIGNIFICANT ACCOUNTING POLICIES

Accounting principles for entities with the unique powers and responsibilities of the nation's central bank have not been formulated by the Financial Accounting Standards Board. The Board of Governors has developed specialized accounting principles and practices that it believes are appropriate for the significantly different nature and function of a central bank as compared with the private sector. These accounting principles and practices are documented in the *Financial Accounting Manual for Federal Reserve Banks* ("Financial Accounting Manual"), which is issued by the Board of Governors. All Reserve Banks are required to adopt and apply accounting policies and practices that are consistent with the Financial Accounting Manual.

The financial statements have been prepared in accordance with the Financial Accounting Manual. Differences exist between the accounting principles and practices of the System and accounting principles generally accepted in the United States of America ("GAAP"). The primary difference is the presentation of all security holdings at amortized cost, rather than at the fair value presentation requirements of GAAP. In addition, the Bank has elected not to present a Statement of Cash Flows. The Statement of Cash Flows has not been included because the liquidity and cash position of the Bank are not of primary concern to the users of these financial statements. Other information regarding the Bank's activities is provided in, or may be derived from, the Statements of Condition, Income, and Changes in Capital. A Statement of Cash Flows, therefore, would not provide any additional useful information. There are no other significant differences between the policies outlined in the Financial Accounting Manual and GAAP.

Each Reserve Bank provides services on behalf of the System for which costs are not shared. Major services provided on behalf of the System by the Bank, for which the costs were not redistributed to the other Reserve Banks, include: Standard Cash Automation, Currency Technology Office, National Procurement Office, Daylight Overdraft Reporting and Pricing, and the Payroll Central Business Administration Function. Costs are, however, redistributed to other Reserve Banks for computing and support services the Bank provides for the System. The Bank's total reimbursement for these services was $250 million and $216 million for the years ended December 31, 2004 and 2003, respectively, and is included in "Other credits" on the Statements of Income.

The preparation of the financial statements in conformity with the Financial Accounting Manual requires management to make certain estimates and assumptions that affect the reported amounts of assets and liabilities, disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of income and expenses during the reporting period. Actual results could differ from those estimates. Certain amounts relating to the prior year have been reclassified to conform to the current-year presentation. Unique accounts and significant accounting policies are explained below.

a. Gold Certificates

The Secretary of the Treasury is authorized to issue gold certificates to the Reserve Banks to monetize gold held by the U.S. Treasury. Payment for the gold certificates by the Reserve Banks is made by crediting equivalent amounts in dollars into the account established for the U.S. Treasury. These gold certificates held by the Reserve Banks are required to be backed by the gold of the U.S. Treasury. The U.S. Treasury may reacquire the gold certificates at any time and the Reserve Banks must deliver them to the U.S. Treasury. At such time, the U.S. Treasury's account is charged, and the Reserve Banks' gold certificate accounts are lowered. The value of gold for purposes of backing the gold certificates is set by law at $42 2/9 a fine troy ounce. The Board of Governors allocates the gold certificates among Reserve Banks once a year based on average Federal Reserve notes outstanding in each District.

b. Special Drawing Rights Certificates

Special drawing rights ("SDRs") are issued by the International Monetary Fund ("Fund") to its members in proportion to each member's quota in the Fund at the time of issuance. SDRs serve as a supplement to international monetary reserves and may be transferred from one national monetary authority to another. Under the law providing for United States participation in the SDR system, the Secretary of the U.S. Treasury is authorized to issue SDR certificates, somewhat like gold certificates, to the Reserve Banks. At such time, equivalent amounts in dollars are credited to the account established for the U.S. Treasury, and the Reserve Banks' SDR certificate accounts are increased. The Reserve Banks are required to purchase SDR certificates, at the direction of the U.S. Treasury, for the purpose of financing SDR acquisitions or for financing exchange stabilization operations. At the time SDR transactions occur, the Board of Governors allocates SDR certificate transactions among Reserve Banks based upon Federal Reserve notes outstanding in each District at the end of the preceding year. There were no SDR transactions in 2004 or 2003.

c. Loans to Depository Institutions

The Depository Institutions Deregulation and Monetary Control Act of 1980 provides that all depository institutions that maintain reservable transaction accounts or nonpersonal time deposits, as defined in Regulation D issued by the Board of Governors, have borrowing privileges at the discretion of the Reserve Bank. Borrowers execute certain lending agreements and deposit sufficient collateral before credit is extended. Loans are evaluated for collectibility, and currently all are considered collectible and fully collateralized. If loans were ever deemed to be uncollectible, an appropriate reserve would be established. Interest is accrued using the applicable discount rate established at least every fourteen days

by the Board of Directors of the Reserve Bank, subject to review by the Board of Governors. Loans to depository institutions are reported as "Other assets."

d. U.S. Government and Federal Agency Securities and Investments Denominated in Foreign Currencies

The FOMC has designated the FRBNY to execute open market transactions on its behalf and to hold the resulting securities in the portfolio known as the System Open Market Account ("SOMA"). In addition to authorizing and directing operations in the domestic securities market, the FOMC authorizes and directs the FRBNY to execute operations in foreign markets for major currencies in order to counter disorderly conditions in exchange markets or to meet other needs specified by the FOMC in carrying out the System's central bank responsibilities. Such authorizations are reviewed and approved annually by the FOMC.

The FRBNY has sole authorization by the FOMC to lend U.S. government securities held in the SOMA to U.S. government securities dealers and to banks participating in U.S. government securities clearing arrangements on behalf of the System, in order to facilitate the effective functioning of the domestic securities market. These securities-lending transactions are fully collateralized by other U.S. government securities. FOMC policy requires the FRBNY to take possession of collateral in excess of the market values of the securities loaned. The market values of the collateral and the securities loaned are monitored by the FRBNY on a daily basis, with additional collateral obtained as necessary. The securities lent are accounted for in the SOMA.

F/X contracts are contractual agreements between two parties to exchange specified currencies, at a specified price, on a specified date. Spot foreign contracts normally settle two days after the trade date, whereas the settlement date on forward contracts is negotiated between the contracting parties, but will extend beyond two days from the trade date. The FRBNY generally enters into spot contracts, with any forward contracts generally limited to the second leg of a swap/warehousing transaction.

The FRBNY, on behalf of the Reserve Banks, maintains renewable, short-term F/X swap arrangements with two authorized foreign central banks. The parties agree to exchange their currencies up to a pre-arranged maximum amount and for an agreed-upon period of time (up to twelve months), at an agreed-upon interest rate. These arrangements give the FOMC temporary access to foreign currencies it may need for intervention operations to support the dollar and give the partner foreign central bank temporary access to dollars it may need to support its own currency. Drawings under the F/X swap arrangements can be initiated by either the FRBNY or the partner foreign central bank and must be agreed to by the drawee. The F/X swaps are structured so that the party initiating the transaction (the drawer) bears the exchange rate risk upon maturity. The FRBNY will generally invest the foreign currency received under an F/X swap in interest-bearing instruments.

Warehousing is an arrangement under which the FOMC agrees to exchange, at the request of the Treasury, U.S. dollars for foreign currencies held by the Treasury or ESF over a limited period of time. The purpose of the warehousing facility is to supplement the U.S. dollar resources of the Treasury and ESF for financing purchases of foreign currencies and related international operations.

In connection with its foreign currency activities, the FRBNY, on behalf of the Reserve Banks, may enter into contracts that contain varying degrees of off-balance-sheet market risk, because they represent contractual commitments involving future settlement and counter-party credit risk. The FRBNY controls credit risk by obtaining credit approvals, establishing transaction limits, and performing daily monitoring procedures.

While the application of current market prices to the securities currently held in the SOMA portfolio and investments denominated in foreign currencies may result in values substantially above or below their carrying values, these unrealized changes in value would have no direct effect on the quantity of reserves available to the banking system or on the prospects for future Reserve Bank earnings or capital. Both the domestic and foreign components of the SOMA portfolio from time to time involve transactions that may result in gains or losses when holdings are sold prior to maturity. Decisions regarding the securities and foreign currencies transactions, including their purchase and sale, are motivated by monetary policy objectives rather than profit. Accordingly, market values, earnings, and any gains or losses resulting from the sale of such currencies and securities are incidental to the open market operations and do not motivate its activities or policy decisions.

U.S. government securities and investments denominated in foreign currencies comprising the SOMA are recorded at cost, on a settlement-date basis, and adjusted for amortization of premiums or accretion of discounts on a straight-line basis. Securities sold under agreements to repurchase are accounted for as secured borrowing transactions with the associated interest expense recognized over the life of the transaction. Such transactions are settled by FRBNY. Interest income is accrued on a straight-line basis. Income earned on securities lending transactions is reported as a component of "Other income." Gains and losses resulting from sales of securities are determined by specific issues based on average cost. Foreign-currency-denominated assets are revalued daily at current foreign currency market exchange rates in order to report these assets in U.S. dollars. Realized and unrealized gains and losses on investments denominated in foreign currencies are reported as "Foreign currency gains, net."

Activity related to U.S. government securities bought outright, securities sold under agreements to repurchase, securities loaned, investments denominated in foreign currency, excluding those held under an F/X swap arrangement, and deposit accounts of foreign central banks and governments above core balances are allocated to each Reserve Bank. U.S. government securities purchased under agreements to resell and unrealized gains and losses on the revaluation of foreign currency holdings under F/X swaps and warehousing arrangements are allocated to the FRBNY and not to other Reserve Banks.

In 2003, additional interest income of $61 million, representing one day's interest on the SOMA portfolio, was accrued to reflect a change in interest accrual calculations, of which $4.8 million was allocated to the Bank. The effect of this change was not material; therefore, it was included in the 2003 interest income.

e. Bank Premises, Equipment, and Software

Bank premises and equipment are stated at cost less accumulated depreciation. Depreciation is calculated on a straight-line basis over estimated useful lives of assets ranging from two to fifty years. Major alterations, renovations, and improvements are capitalized at cost as additions to the asset accounts and are amortized over the remaining useful life of the asset. Maintenance, repairs, and minor replacements are charged to operations in the year incurred. Costs incurred for software, either developed internally or acquired for internal use, during the application development stage are capitalized based on the cost of direct services and materials associated with designing, coding, installing, or testing software. Capitalized software costs are amortized on a straight-line basis over the estimated useful lives of the software applications, which range from two to five years.

f. Interdistrict Settlement Account

At the close of business each day, all Reserve Banks and branches assemble the payments due to or from other Reserve Banks and branches as a result of transactions involving accounts residing in other Districts that occurred during the day's operations. Such transactions may include funds settlement, check clearing and ACH operations, and allocations of shared expenses. The cumulative net amount due to or from other Reserve Banks is reported as the "Interdistrict settlement account."

g. Federal Reserve Notes

Federal Reserve notes are the circulating currency of the United States. These notes are issued through the various Federal Reserve agents (the Chairman of the Board of Directors of each Reserve Bank) to the Reserve Banks upon deposit with such agents of certain classes of collateral security, typically U.S. government securities. These notes are identified as issued to a specific Reserve Bank. The Federal Reserve Act provides that the collateral security tendered by the Reserve Bank to the Federal Reserve agent must be equal to the sum of the notes applied for by such Reserve Bank.

Assets eligible to be pledged as collateral security include all Federal Reserve Bank assets. The collateral value is equal to the book value of the collateral tendered, with the exception of securities, whose collateral value is equal to the par value of the securities tendered. The par value of securities pledged for securities sold under agreements to repurchase is similarly deducted.

The Board of Governors may, at any time, call upon a Reserve Bank for additional security to adequately collateralize the Federal Reserve notes. To satisfy the obligation to provide sufficient collateral for outstanding Federal Reserve notes, the Reserve Banks have entered into an agreement that provides for certain assets of the Reserve Banks to be jointly pledged as collateral for the Federal Reserve notes of all Reserve Banks. In the event that this collateral is insufficient, the Federal Reserve Act provides

that Federal Reserve notes become a first and paramount lien on all the assets of the Reserve Banks. Finally, as obligations of the United States, Federal Reserve notes are backed by the full faith and credit of the United States government.

The "Federal Reserve notes outstanding, net" account represents the Bank's Federal Reserve notes outstanding reduced by its currency holdings of $12,275 million, and $9,855 million at December 31, 2004 and 2003, respectively.

h. Capital Paid-in

The Federal Reserve Act requires that each member bank subscribe to the capital stock of the Reserve Bank in an amount equal to 6 percent of the capital and surplus of the member bank. As a member bank's capital and surplus changes, its holdings of Reserve Bank stock must be adjusted. Member banks are state-chartered banks that apply and are approved for membership in the System and all national banks. Currently, only one-half of the subscription is paid-in and the remainder is subject to call. These shares are nonvoting with a par value of $100. They may not be transferred or hypothecated. By law, each member bank is entitled to receive an annual dividend of 6 percent on the paid-in capital stock. This cumulative dividend is paid semiannually. A member bank is liable for Reserve Bank liabilities up to twice the par value of stock subscribed by it.

The Financial Accounting Standards Board (FASB) has deferred the implementation date for SFAS No. 150, "Accounting for Certain Financial Instruments with Characteristics of both Liabilities and Equity" for the Bank. When applicable, the Bank will determine the impact and provide the appropriate disclosures.

i. Surplus

The Board of Governors requires Reserve Banks to maintain a surplus equal to the amount of capital paid-in as of December 31. This amount is intended to provide additional capital and reduce the possibility that the Reserve Banks would be required to call on member banks for additional capital.

Pursuant to Section 16 of the Federal Reserve Act, Reserve Banks are required by the Board of Governors to transfer to the U.S. Treasury as interest on Federal Reserve notes excess earnings, after providing for the costs of operations, payment of dividends, and reservation of an amount necessary to equate surplus with capital paid-in.

In the event of losses or an increase in capital paid-in, payments to the U.S. Treasury are suspended and earnings are retained until the surplus is equal to the capital paid-in. Weekly payments to the U.S. Treasury may vary significantly.

In the event of a decrease in capital paid-in, the excess surplus, after equating capital paid-in and surplus at December 31, is distributed to the U.S. Treasury in the following year. This amount is reported as a component of "Payments to U.S. Treasury as interest on Federal Reserve notes."

j. Income and Costs related to Treasury Services

The Bank is required by the Federal Reserve Act to serve as fiscal agent and depository of the United States. By statute, the Department of the Treasury is permitted, but not required, to pay for these services.

k. Taxes

The Reserve Banks are exempt from federal, state, and local taxes, except for taxes on real property. The Bank's real property taxes were $2.2 million for each of the years ended December 31, 2004 and 2003, and are reported as a component of "Occupancy expense."

l. Restructuring Charges

In 2003, the System started the restructuring of several operations, primarily check, cash, and Treasury services. The restructuring included streamlining the management and support structures, reducing staff, decreasing the number of processing locations, and increasing processing capacity in the remaining locations. These restructuring activities continued in 2004.

Footnote 10 describes the restructuring and provides information about the Bank's costs and liabilities associated with employee separations and contract terminations. The costs associated with

the write-down of certain Bank assets are discussed in footnote 6. Costs and liabilities associated with enhanced pension benefits for all Reserve Banks are recorded on the books of the FRBNY.

4. U.S. GOVERNMENT SECURITIES

Securities bought outright are held in the SOMA at the FRBNY. An undivided interest in SOMA activity and the related premiums, discounts, and income, with the exception of securities purchased under agreements to resell, is allocated to each Reserve Bank on a percentage basis derived from an annual settlement of interdistrict clearings that occurs in April of each year. The settlement equalizes Reserve Bank gold certificate holdings to Federal Reserve notes outstanding. The Bank's allocated share of SOMA balances was approximately 7.600 percent and 7.690 percent at December 31, 2004 and 2003, respectively.

The Bank's allocated share of U.S. government securities, net held in the SOMA at December 31, was as follows (in millions):

	2004	2003
Par value:		
U.S. government:		
Bills	$ 19,987	$ 18,828
Notes	27,425	24,868
Bonds	7,146	7,573
Total par value	54,558	51,269
Unamortized premiums	715	754
Unaccreted discounts	(125)	(69)
Total allocated to Bank	$ 55,148	$ 51,954

The total of the U.S. government securities, net held in the SOMA was $725,584 million and $675,569 million at December 31, 2004 and 2003, respectively.

The maturity distribution of U.S. government securities bought outright and securities sold under agreements to repurchase, that were allocated to the Bank at December 31, 2004, was as follows (in millions):

Maturities of Securities Held	U.S. Government Securities (Par value)	Securities Sold Under Agreements to Repurchase (Contract amount)
Within 15 days	$ 2,329	$ 2,340
16 days to 90 days	13,556	—
91 days to 1 year	12,952	—
Over 1 year to 5 years	15,829	—
Over 5 years to 10 years	4,133	—
Over 10 years	5,758	—
Total	$ 54,557	$ 2,340

At December 31, 2004 and 2003, U.S. government securities with par values of $6,609 million and $4,426 million, respectively, were loaned from the SOMA, of which $502 million and $340 million were allocated to the Bank.

At December 31, 2004 and 2003, securities sold under agreements to repurchase with contract amounts of $30,783 million and $25,652 million, respectively, and par values of $30,808 million and $25,658 million, respectively, were outstanding. The Bank's allocated share at December 31, 2004 and 2003 was $2,340 million and $1,973 million, respectively, of the contract amount and $2,342 million and $1,973 million, respectively, of the par value.

5. INVESTMENTS DENOMINATED IN FOREIGN CURRENCIES

The FRBNY, on behalf of the Reserve Banks, holds foreign currency deposits with foreign central banks and the Bank for International Settlements and invests in foreign government debt instruments. Foreign government debt instruments held include both securities bought outright and securities purchased under agreements to resell. These investments are guaranteed as to principal and interest by the foreign governments.

Each Reserve Bank is allocated a share of foreign-currency-denominated assets, the related interest income, and realized and unrealized foreign currency gains and losses, with the exception of unrealized gains and losses on F/X swaps and warehousing transactions. This allocation is based on the ratio of each Reserve Bank's capital and surplus to aggregate capital and surplus at the preceding December 31. The Bank's allocated share of investments denominated in foreign currencies was approximately 23.442 percent and 24.740 percent at December 31, 2004 and 2003, respectively.

The Bank's allocated share of investments denominated in foreign currencies, valued at current foreign currency market exchange rates at December 31, was as follows (in millions):

	2004	2003
European Union Euro:		
Foreign currency deposits	$ 1,421	$ 1,699
Securities purchased under agreements to resell	502	509
Government debt instruments	900	503
Japanese Yen:		
Foreign currency deposits	361	365
Government debt instruments	1,796	1,816
Accrued interest	29	23
Total	$ 5,009	$ 4,915

Total System investments denominated in foreign currencies were $21,368 million and $19,868 million at December 31, 2004 and 2003, respectively.

The maturity distribution of investments denominated in foreign currencies which were allocated to the Bank at December 31, 2004, was as follows (in millions):

Maturities of Investments Denominated in Foreign Currencies	European Euro	Japanese Yen	Total
Within 1 year	$ 2,105	$ 2,156	$ 4,261
Over 1 year to 5 years	705	—	705
Over 5 years to 10 years	43	—	43
Over 10 years	—	—	—
Total	$ 2,853	$ 2,156	$ 5,009

At December 31, 2004 and 2003, there were no material open foreign exchange contracts.

At December 31, 2004 and 2003, the warehousing facility was $5,000 million, with no balance outstanding.

6. BANK PREMISES, EQUIPMENT, AND SOFTWARE

A summary of bank premises and equipment at December 31 is as follows (in millions):

	Maximum Useful Life (in years)	2004	2003
Bank premises and equipment:			
Land	N/A	$ 22.5	$ 22.6
Buildings	50	138.5	133.6
Building machinery and equipment	20	50.1	49.1
Construction in progress	N/A	2.6	4.9
Furniture and equipment	10	311.6	315.7
Subtotal		$ 525.3	$ 525.9
Accumulated depreciation		(273.7)	(259.0)
Bank premises and equipment, net		$ 251.6	$ 266.9
Depreciation expense, for the years ended		$ 44.5	$ 39.9

Bank premises and equipment at December 31 include the following amounts for leases that have been capitalized (in millions):

	2004	2003
Bank premises and equipment	$ 10	$ 8
Accumulated depreciation	(5)	(5)
Capitalized leases, net	$ 5	$ 3

The Bank leases unused space to outside tenants. Those leases have terms ranging from one to 4 years. Rental income from such leases was $1.4 million and $1.6 million for the years ended December 31, 2004 and 2003, respectively. Future minimum lease payments under noncancelable agreements in existence at December 31, 2004, were (in millions):

2005	$ 1.3
2006	1.3
2007	—
2008	—
2009	—
Thereafter	—
	$ 2.6

The Bank has capitalized software assets, net of amortization, of $84 million and $57 million at December 31, 2004 and 2003, respectively. Amortization expense was $27 million and $29 million for the years ended December 31, 2004 and 2003, respectively.

Assets impaired as a result of the Bank's restructuring plan, as discussed in footnote 10, include furniture and equipment. There were no asset impairment losses in 2004. Asset impairment losses of $163,299 for the period ending December 31, 2003 were determined using fair values based on quoted market values or other valuation techniques and are reported as a component of "Other credits."

7. COMMITMENTS AND CONTINGENCIES

At December 31, 2004, the Bank was obligated under noncancelable leases for premises and equipment with terms ranging from one to approximately five years. These leases provide for increased rental payments based upon increases in real estate taxes, operating costs, or selected price indices.

Rental expense under operating leases for certain operating facilities, warehouses, and data processing and office equipment (including taxes, insurance and maintenance when included in rent), net of sublease rentals, was $38 million for each of the years ended December 31, 2004 and 2003. Certain of the Bank's leases have options to renew.

Future minimum rental payments under capital leases, net of sublease rentals, with terms of one year or more, at December 31, 2004, were (in millions):

		Capital
2005	$	0.1
2006		0.1
2007		0.1
2008		0.1
2009		0.1
Thereafter		—
		0.5
Amount representing interest		(0.0)
Present value of net minimum lease payment	**$**	**0.5**

Future minimum rental payments under noncancelable operating leases, net of sublease rentals, with terms of one year or more, at December 31, 2004 were not material.

At December 31, 2004, the Bank, acting on its own behalf, had other commitments and long-term obligations extending through the year 2007, with a remaining amount of $16.7 million. As of December 31, 2004, none of the commitments were recognized. Purchases of $24.6 million and $9.3 million were made against these commitments during 2004 and 2003, respectively. These commitments represent outsourcing costs associated with the hardware and software platforms for a web infrastructure project as well as Virtual Private Network (VPN) services and have variable and fixed components. The variable portion of the commitments is for support services related to the web infrastructure as well as monthly connection charges and other incremental charges for ad hoc services associated with the VPN. The fixed payments for the next five years under these commitments are (in millions):

		Fixed Commitment
2005	$	11.2
2006		3.7
2007		1.7
2008		—
2009		—

In addition, at December 31, 2004, the Bank, acting on behalf of the Reserve Banks, had contractual commitments extending through the year 2011 with a remaining amount of $81.7 million. As of December 31, 2004, $36.3 million of these commitments was recognized. Purchases of $35.0 million and $32.8 million were made against these commitments during 2004 and 2003, respectively. It is estimated that the Bank's allocated share of these commitments will be $7.7 million. These commitments represent maintenance of currency processing machines and have variable and fixed components. The variable portion of the commitment is for consumable parts and incremental maintenance above the minimum basis.

The fixed payments for the next five years under these commitments are (in millions):

	Fixed Commitment
2005	$ 36.3
2006	33.5
2007	9.2
2008	0.7
2009	0.7

Under the Insurance Agreement of the Federal Reserve Banks dated as of March 2, 1999, each of the Reserve Banks has agreed to bear, on a per incident basis, a pro rata share of losses in excess of one percent of the capital paid-in of the claiming Reserve Bank, up to 50 percent of the total capital paid-in of all Reserve Banks. Losses are borne in the ratio that a Reserve Bank's capital paid-in bears to the total capital paid-in of all Reserve Banks at the beginning of the calendar year in which the loss is shared. No claims were outstanding under such agreement at December 31, 2004 or 2003.

The Bank is involved in certain legal actions and claims arising in the ordinary course of business. Although it is difficult to predict the ultimate outcome of these actions, in management's opinion, based on discussions with counsel, the aforementioned litigation and claims will be resolved without material adverse effect on the financial position or results of operations of the Bank.

8. RETIREMENT AND THRIFT PLANS

Retirement Plans

The Bank currently offers two defined benefit retirement plans to its employees, based on length of service and level of compensation. Substantially all of the Bank's employees participate in the Retirement Plan for Employees of the Federal Reserve System ("System Plan") and the Benefit Equalization Retirement Plan ("BEP"). In addition, certain Bank officers participate in the Supplemental Employee Retirement Plan ("SERP").

The System Plan is a multi-employer plan with contributions fully funded by participating employers. Participating employers are the Federal Reserve Banks, the Board of Governors of the Federal Reserve System, and the Office of Employee Benefits of the Federal Reserve Employee Benefits System. No separate accounting is maintained of assets contributed by the participating employers. The FRBNY acts as a sponsor of the Plan for the System and the costs associated with the Plan are not redistributed to the Bank. The Bank's projected benefit obligation and net pension costs for the BEP and the SERP at December 31, 2004 and 2003, and for the years then ended, are not material.

Thrift Plan

Employees of the Bank may also participate in the defined contribution Thrift Plan for Employees of the Federal Reserve System ("Thrift Plan"). The Bank's Thrift Plan contributions totaled $8 million for each of the years ended December 31, 2004 and 2003, and are reported as a component of "Salaries and other benefits."

9. POSTRETIREMENT BENEFITS OTHER THAN PENSIONS AND POSTEMPLOYMENT BENEFITS

Postretirement Benefits other than Pensions

In addition to the Bank's retirement plans, employees who have met certain age and length of service requirements are eligible for both medical benefits and life insurance coverage during retirement.

The Bank funds benefits payable under the medical and life insurance plans as due and, accordingly, has no plan assets. Net postretirement benefit costs are actuarially determined using a January 1 measurement date.

Following is a reconciliation of beginning and ending balances of the benefit obligation (in millions):

	2004	2003
Accumulated postretirement benefit obligation at January 1	$ 107.8	$ 87.1
Service cost-benefits earned during the period	2.0	2.1
Interest cost of accumulated benefit obligation	5.5	5.7
Actuarial (gain)/loss	(8.0)	11.7
Curtailment loss	—	3.7
Special termination loss	—	0.6
Contributions by plan participants	0.8	0.6
Benefits paid	(5.2)	(3.7)
Plan amendments	(9.2)	—
Accumulated postretirement benefit obligation at December 31	**$ 93.7**	$ 107.8

At December 31, 2004 and 2003, the weighted-average discount rate assumptions used in developing the postretirement benefit obligation were 5.75 percent and 6.25 percent, respectively.

Following is a reconciliation of the beginning and ending balance of the plan assets, the unfunded postretirement benefit obligation, and the accrued postretirement benefit costs (in millions):

	2004	2003
Fair value of plan assets at January 1	$ —	$ —
Actual return on plan assets	—	—
Contributions by the employer	4.4	3.1
Contributions by plan participants	0.8	0.6
Benefits paid	(5.2)	(3.7)
Fair value of plan assets at December 31	**$ —**	$ —
Unfunded postretirement benefit obligation	$ 93.7	$ 107.8
Unrecognized prior service cost	10.8	9.9
Unrecognized net actuarial loss	(27.7)	(36.6)
Accrued postretirement benefit costs	**$ 76.8**	$ 81.1

Accrued postretirement benefit costs are reported as a component of "Accrued benefit costs."

For measurement purposes, the assumed health care cost trend rates at December 31 are as follows:

	2004	2003
Health care cost trend rate assumed for next year	9.00%	10.00%
Rate to which the cost trend rate is assumed to decline (the ultimate trend rate)	4.75%	5.00%
Year that the rate reaches the ultimate trend rate	2011	2011

Assumed health care cost trend rates have a significant effect on the amounts reported for health care plans. A one percentage point change in assumed health care cost trend rates would have the following effects for the year ended December 31, 2004 (in millions):

	One Percentage Point Increase	One Percentage Point Decrease
Effect on aggregate of service and interest cost components of net periodic postretirement benefit costs	$ 0.7	$ (0.6)
Effect on accumulated postretirement benefit obligation	9.6	(7.8)

The following is a summary of the components of net periodic postretirement benefit costs for the years ended December 31 (in millions):

	2004	2003
Service cost-benefits earned during the period	**$ 2.0**	$ 2.1
Interest cost of accumulated benefit obligation	**5.5**	5.7
Amortization of prior service cost	**(1.1)**	(1.0)
Recognized net actuarial loss	**0.9**	1.0
Total periodic expense	**$ 7.3**	$ 7.8
Curtailment (gain)/loss	**(7.2)**	2.9
Special termination loss	**—**	0.6
Net periodic postretirement benefit costs	**$ 0.1**	$ 11.3

At December 31, 2004 and 2003, the weighted-average discount rate assumptions used to determine net periodic postretirement benefit costs were 6.25 percent and 6.75 percent, respectively.

Net periodic postretirement benefit costs are reported as a component of "Salaries and other benefits."

A plan amendment that modified the credited service period eligibility requirements created curtailment gains. The recognition of special termination losses is primarily the result of enhanced retirement benefits provided to employees during the restructuring described in footnote 10. Because the special termination loss is less than $50,000, the amount is not displayed in the tables above.

The Medicare Prescription Drug, Improvement and Modernization Act of 2003 (the "Act") was enacted in December 2003. The Act established a prescription drug benefit under Medicare ("Medicare Part D") and a federal subsidy to sponsors of retiree health care benefit plans that provide benefits that are at least actuarially equivalent to Medicare Part D. Following the guidance of the Financial Accounting Standards Board, the Bank elected to defer recognition of the financial effects of the Act until further guidance was issued in May 2004.

Benefits provided to certain participants are at least actuarially equivalent to Medicare Part D. The estimated effects of the subsidy, retroactive to January 1, 2004, are reflected in actuarial gain in the accumulated postretirement benefit obligation and net periodic postretirement benefit costs.

Following is a summary of the effects of the expected subsidy (in millions):

	2004
Decrease in the accumulated postretirement benefit obligation	**$ 15.8**
Decrease in the net periodic postretirement benefit costs	**$ 2.2**

Expected benefit payments (in millions):

	Without Subsidy	With Subsidy
2005	$ 4.8	$ 4.8
2006	4.9	4.4
2007	5.0	4.5
2008	5.1	4.6
2009	5.2	4.6
2010-2014	28.2	24.5
Total	**$ 53.2**	**$ 47.4**

Postemployment Benefits

The Bank offers benefits to former or inactive employees. Postemployment benefit costs are actuarially determined using a December 31, 2004 measurement date and include the cost of medical and dental insurance, survivor income, and disability benefits. For 2004, the Bank changed its practices for estimating postemployment costs and used a 5.25 percent discount rate and the same health care trend rates as were used for projecting postretirement costs. Costs for 2003, however, were estimated using the same discount rate and health care trend rates as were used for projecting postretirement costs. The accrued postemployment benefit costs recognized by the Bank at December 31, 2004 and 2003, were $13.8 million and $17.6 million, respectively. This cost is included as a component of "Accrued benefit costs." Net periodic postemployment benefit costs included in 2004 and 2003 operating expenses were ($1.9) million and $3.5 million, respectively.

10. BUSINESS RESTRUCTURING CHARGES

In 2003, the Bank announced plans for restructuring to streamline operations and reduce costs, including consolidation of check operations and staff reductions in various functions of the Bank. In 2004, additional consolidation and restructuring initiatives were announced in the savings bonds operations. These actions resulted in the following business restructuring charges:

Major categories of expense (in millions):

	Total Estimated Costs	Accrued Liability 12/31/03	Total Charges	Total Paid	Accrued Liability 12/31/04
Employee separation	$ 6.1	$ 5.6	$ 0.5	$ 1.8	$ 4.3
Contract termination	0.3	—	—	—	—
Total	**$ 6.4**	**$ 5.6**	**$ 0.5**	**$ 1.8**	**$ 4.3**

Employee separation costs are primarily severance costs related to identified staff reductions of approximately 193, including 115 staff reductions related to restructuring announced in 2003. These costs are reported as a component of "Salaries and other benefits." Contract termination costs include the charges resulting from terminating existing lease and other contracts and are shown as a component of "Other credits."

Restructuring costs associated with the write-downs of certain Bank assets, including furniture and equipment are discussed in footnote 6. Costs associated with enhanced pension benefits for all Reserve Banks are recorded on the books of the FRBNY as discussed in footnote 8. Costs associated with enhanced postretirement benefits are disclosed in footnote 9.

The Bank anticipates substantially completing its announced plans by June 2005.

SUMMARY OF OPERATIONS (unaudited)

	Dollar Amount		Volume	
Year-to-Date December	**2004**	2003	**2004**	2003
CASH				
Currency received and counted	**50.9 Billion**	50.6 Billion	**3.1 Billion**	3.2 Billion
Currency destroyed	**5.9 Billion**	6.2 Billion	**496.1 Million**	514.8 Million
Coin bags received and counted	**33.5 Million**	57.1 Million	**100.1 Thousand**	154.3 Thousand
NONCASH PAYMENTS				
Commercial checks processed	**1.3 Trillion**	1.5 Trillion	**1.3 Billion**	1.6 Billion
Commercial checks, packaged items handled	**361.2 Billion**	382.5 Billion	**587.4 Million**	676.5 Million
U.S. government checks processed	**0**	41.8 Billion	**0**	27.8 Million
LOANS TO DEPOSITORY INSTITUTIONS				
Discount window loans made	**474.6 Million**	80.7 Million	**47**	35
SERVICES TO U.S. TREASURY AND GOVERNMENT AGENCIES				
Issues, redemptions, and exchanges of U.S. savings bonds	**1.0 Billion**	2.2 Billion	**4.5 Million**	6.2 Million
Food stamps redeemed	**70.0 Thousand**	79.4 Million	**28.0 Thousand**	15.5 Million

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