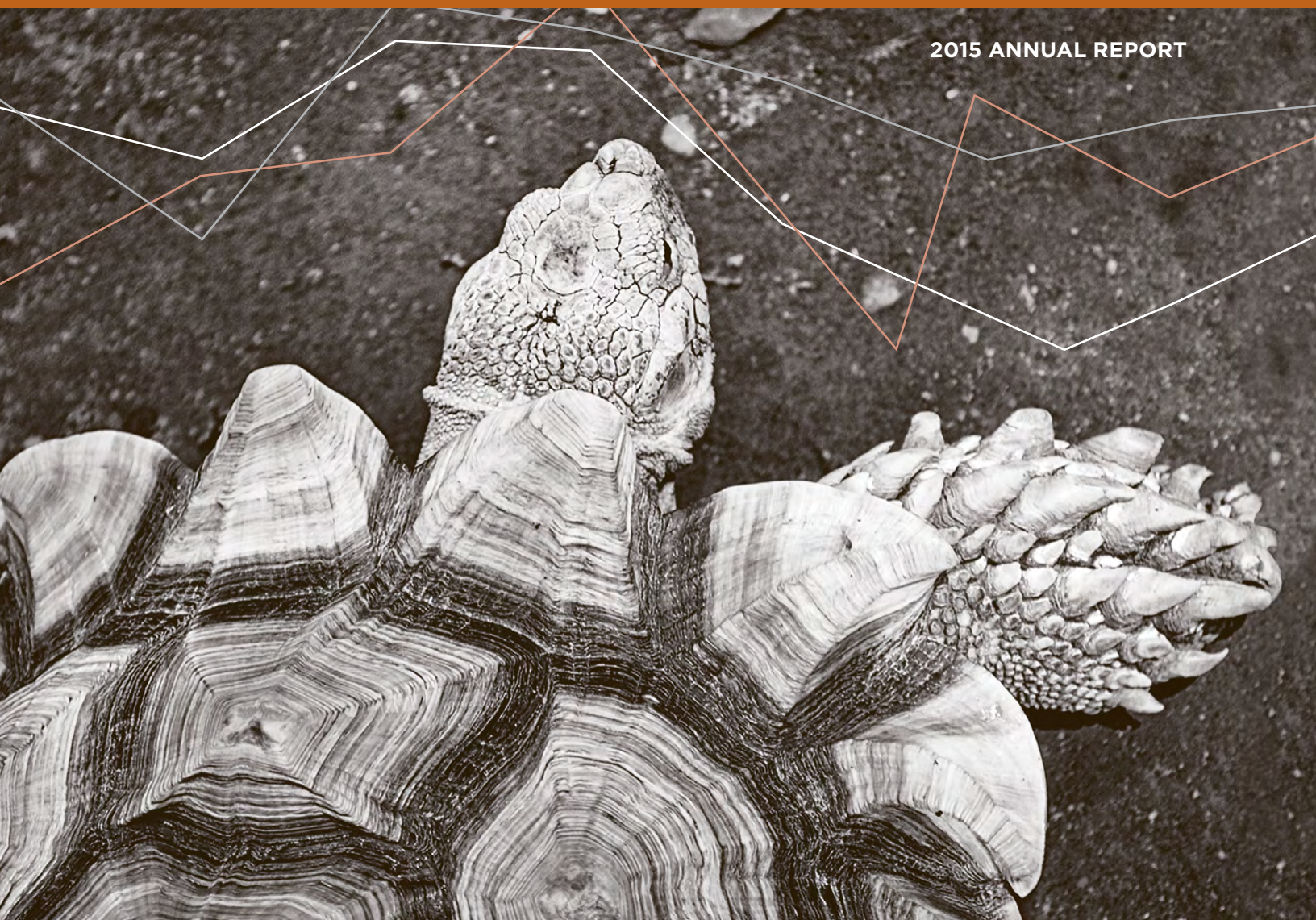
A "New Normal"?

THE PROSPECTS FOR LONG-TERM GROWTH IN THE UNITED STATES

FEDERAL RESERVE BANK OF RICHMOND

2015 ANNUAL REPORT



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Is Innovation Over?

PHOTO: MICHAEL BATTS

Jeffrey M. Lacker
President

By many measures, the U.S. economy is performing quite well. Since the Great Recession ended in the summer of 2009, the unemployment rate has been cut in half, the economy has created more than 12 million jobs, and GDP growth has averaged a solid 2.1 percent annually.

Yet it's possible to paint a less rosy picture. Productivity growth has been slow, and the number of Americans working has declined significantly in recent years, due to both slowing population growth and a decline in the share of the population that is working. The current rate of GDP growth is well below the average annual rate of 3.4 percent we experienced between 1947 and 2007—and it appears unlikely to return to the previous trend any time soon. But does that mean we should be pessimistic about our economy's future?

Aaron Steelman and John Weinberg address this important question in this year's feature essay, "A 'New Normal'? The Prospects for Long-Term Growth in the United States." In particular, they review two prominent arguments that the U.S. economy is likely to continue to grow substantially more slowly than in previous decades.

One adherent to this view is Tyler Cowen of George Mason University. In a 2011 book, he argues that the United States has largely picked the "low-hanging fruit" that fueled rapid growth in previous eras. One such piece of fruit, according to Cowen, was the abundant supply of free land and natural resources, which attracted smart and ambitious workers from Europe. Another was the opportunity to dramatically raise the education level of the workforce. For much of the 20th century, the rapid increase in the number of Americans with high school and college degrees contributed to high productivity growth. But educational attainment appears to have stalled in recent years.

Cowen also believes that the pace of innovation has slowed in recent decades, an argument that features prominently in research by Robert Gordon of Northwestern University as well. Gordon describes the years between 1920 and 1970 as the "Second Industrial Revolution," a period of dramatic changes in technology and living standards. Electricity, indoor plumbing, and antibiotics, among other innovations, revolutionized both home and work life and led to rapid productivity gains. But the recent computer revolution, in Gordon's view, has a more limited effect on how we live and work.

Gordon also points to four significant headwinds facing the U.S. economy. Like Cowen, he views the slowdown in educational attainment as a

major drag on GDP and productivity growth. In addition, Gordon argues that rising income inequality, demographic changes such as the retirement of the baby boom generation, and rising public debt are likely to inhibit increases in living standards.

Steelman and Weinberg offer the reader an overview of the economics of growth, which provides a framework for evaluating these ideas. The key takeaway is that long-run economic growth is driven primarily by technological change, which itself depends on the growth of knowledge and ideas. To put it more concretely, an economy can grow in the short term by adding more workers or more machines (or, in economic terms, more labor or more capital). But long-term growth depends on people developing new machines, and on workers learning new skills to operate those machines.

What does this imply about the United States' long-term prospects? On the one hand, if it is indeed true that the pace of innovation has slowed, then those prospects might be gloomy. But on the other hand, as Steelman and Weinberg note, there is plenty of reason for optimism. First, innovation is notoriously difficult, if not impossible, to predict; the fact that a future innovation on the scale of electric light is not immediately apparent does not mean that such an innovation won't occur. Moreover, we shouldn't discount the improvements in our quality of life that recent technological changes have afforded us, even if those improvements aren't well captured by national statistics.

Steelman and Weinberg also discuss several implications for policymakers, including trade policy and immigration reform. But the one that strikes me as most urgent is education, because data on wages and educational attainment suggest that we are failing to keep up with the economy's demand for skilled workers.

What can we do to ensure our workforce has the skills necessary to perpetuate the United States' economic growth? A full discussion of this issue is beyond the scope of Steelman and Weinberg's essay, but the Richmond Fed's review of the available research suggests several key strategies. First, we must do a better job of informing middle and high school students about what is required for success in college (as well as ensure that the K–12 education system is capable of providing them with those skills, although I know this is easier said than done). We can also do a better job of providing these students with information about multiple postsecondary educational options, so that students who are not prepared for or do not wish to attend college can take advantage of other opportunities to acquire valuable skills.

At the same time, there is evidence that some students who are well-qualified for college overestimate the costs of attending; providing such students with targeted information could improve their decision-making. Finally, and perhaps most crucially, investment in high-quality early childhood education would yield exceptional returns and would help broaden opportunities for students of all backgrounds. I believe these strategies aimed at strengthening growth in human capital can not only bolster our nation's prosperity over time but also can equip a broader range of our citizens with the skills they need to share in that prosperity.

Jeffrey M. Lacker
President

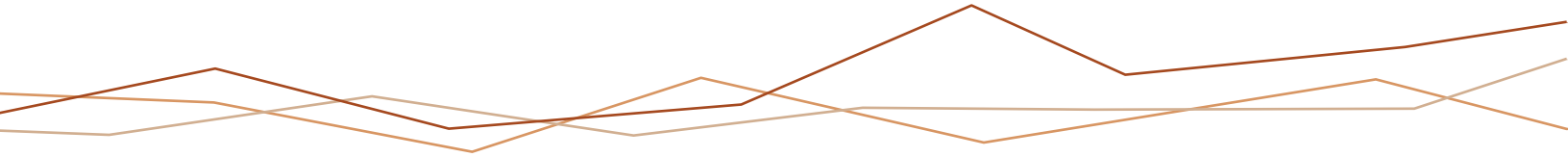
A "New Normal"?

THE PROSPECTS FOR LONG-TERM GROWTH IN THE UNITED STATES

By Aaron Steelman and John A. Weinberg

Following the recession of 2007–09, annual U.S. economic growth rates have been below long-term trends. While there are plausible arguments that this sluggishness may continue for some time, there is good reason to think more rapid growth rates will return.

The United States, since the end of World War II, has generally been seen around the world as an economic powerhouse. Indeed, that period has witnessed large gains in most Americans' quality of life, as life spans have grown sharply, access to education has expanded markedly, and people regularly enjoy consumer items that would have once been considered luxuries or were simply unimagined when the hostilities in Europe and Asia ended and Americans got back to peacetime life. From 1947 through 2007, the economy grew at roughly 3.4 percent annually. While growth is often expressed in terms of total economic output, a growing population will bring with it some amount of overall growth.



To measure improvement in average standards of living, growth of GDP per capita is the standard yardstick. The post-war average of 3.4 percent overall growth translated to an average growth rate per capita of about 2.1 percent. During that period, the United States experienced a few significant recessions and several milder downturns. Such fluctuations can be acutely felt by many people when they occur, but against the longer-run performance, they look relatively insignificant.

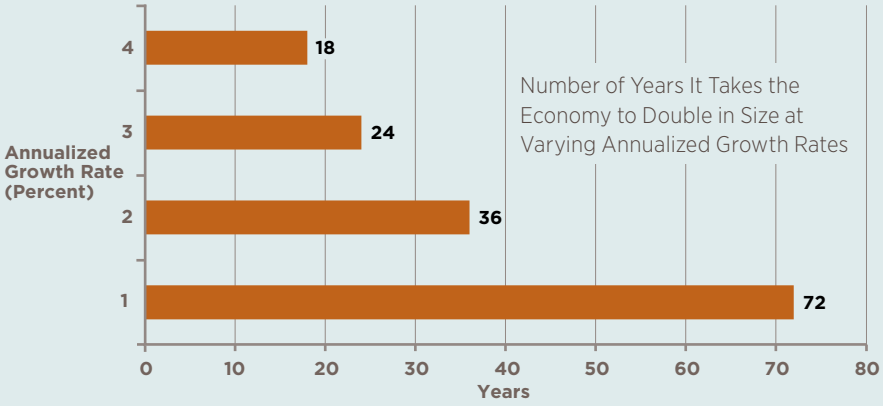
Since the financial crisis and Great Recession, though, many people's perception of the strength of the U.S. economy and its prospects for the future have dimmed. These skeptics point to the slowed pace of growth: Since 2010, the U.S. economy has grown at a rate of roughly 2.1 percent annually, which translates to an average growth rate per capita of about 1.3 percent, both well below the post-World War II rates prior to the Great Recession and, perhaps more notably, far below what has been seen in "catch-up" periods following previous significant downturns. For instance, following the 1981–82 recession, the U.S. economy rebounded sharply, growing 7.8 percent in 1983 and 5.7 percent in 1984. Some observers believe we have entered a period characterized by a "new normal" or even a "new mediocre"—and that it looks very different from what, on average, Americans enjoyed in the immediate decades after the soldiers returned home from World War II.[1] Proponents of the new normal hypothesis maintain that the United States is likely to grow at a substantially slower rate than it did prior to the Great Recession, with many predicting growth rates of roughly 1.5 percent to 2 percent.[2]

Some commentators who would generally place themselves in the skeptics camp argue that the new normal had already started, in a sense, prior to the Great Recession—that, the U.S. economy was already experiencing lower productivity and growth rates due to several important long-term trends. As Tyler Cowen, an economist at George Mason University, put it in his 2011 book *The Great Stagnation*, the United States has "built social and economic institutions on the expectation of a lot of low-hanging fruit, but that fruit is mostly gone" and has been since roughly the early 1970s.[3] In particular, he identifies three types of increasingly scarce "fruit": free land, technological breakthroughs, and smart but relatively uneducated kids.[4]

Regarding the first, until the beginning of the 20th century, free and fertile American land was plentiful and not only "did the United States reap a huge bounty from the free land (often stolen from Native Americans, one should not forget), but abundant resources helped the United States attract many of the brightest and most ambitious workers from Europe," Cowen writes. "Taking in these workers, and letting them cultivate the land, was like plucking low-hanging fruit." Second, Cowen also sees technological innovation, and especially breakthroughs, as slowing. "Life is better and we have more stuff, but the pace of change has slowed down compared to what people saw two or three generations ago." Third, in 1900, a very small percentage of Americans graduated from high school, while estimates of high school completion today range from roughly 75 percent to 90 percent. "In other words," Cowen writes,

Relatively Small Changes in Growth Rates Have Big Effects Over Time

There are many reasons why we might want to focus on long-run economic performance. But perhaps the most compelling one can be shown in the accompanying figure. In a sense, the faster the economy grows, the faster the future reaches us. Just like accounting for retirement, one can also account for where the economy will be in a given number of years using some basic actuarial principles. If an economy grows at 1 percent a year, it will take roughly 72 years for it to double in size in gross terms, a little less than the average lifespan of an American today. In contrast, if you change that assumption to an annualized growth rate of 3 percent, an economy will be twice as large in only 24 years, about the time when many Americans have finished college and are getting settled into their careers. So while we are justifiably concerned about today, it's useful to keep in mind that what might seem like relatively small changes in the longer-run growth path can have profound implications for our well-being and that of future generations.



"earlier in the twentieth century a lot of potential geniuses didn't get much education, but rather were literally 'kept down on the farm.' Taking a smart, motivated person out of an isolated environment and sending that person to high school will bring big productivity gains." Cowen makes a similar observation about college attendance. In 1900, he notes, just one in 400 Americans went to college, while about 40 percent of 18–24-year-olds were enrolled in college in 2009, a number that was roughly the same in 2015.

In a series of papers and his recently published book *The Rise and Fall of American Growth*, Northwestern University economist Robert J. Gordon also argues that the U.S. economy is likely to grow slowly—and also, like Cowen, traces this downward trajectory to roughly 1970. At the heart of Gordon's case are two ideas: first, that the pace of innovation has slowed, particularly compared to the middle of the 20th century, and there is little reason to believe that will change and, second, there are four large additional "headwinds" facing the U.S. economy.

The U.S. experienced several short recessions during the 1950s and 1960s, but overall economic growth was relatively strong.

Gordon describes the century following the Civil War as the period of great economic liberation, where a large portion of the United States was freed from "an unremitting daily grind of painful manual labor, household drudgery, darkness, isolation, and early death." He elaborates: "Manual outdoor jobs were replaced by work in air-conditioned environments, housework was increasingly performed by electric appliances, darkness was replaced by light, and isolation was replaced not just by travel, but also by color television images bringing the world into the living room. Most important, a newborn infant could expect to live not to age forty-five, but to age seventy-two."[5] What is more, these stark changes in Americans' way of life were broadly enjoyed, with virtually every American benefiting from the development of public waterworks, electricity, and antibiotics, and most seeing their workweeks become shorter and less physically onerous while their take-home pay increased. Leisure time and retirement, once abstract concepts, became the norm. As a result, Gordon dubs the period 1920–70 as the "Second Industrial Revolution" or "IR #2".

There has been innovation since 1970, Gordon concedes, but it can hardly be compared to IR #2. He argues that the effects of the digital revolution, or "IR #3," which

started with innovations that can be traced to the late 1970s and early 1980s but did not produce major changes in the way business was done until the mid-1990s, have been "felt in a limited sphere of human activity, in contrast to IR #2, which changed everything." Moreover, the productivity gains produced by IR #3 were most acutely felt for only about a decade, with advances coming much more slowly since 2004.[6]

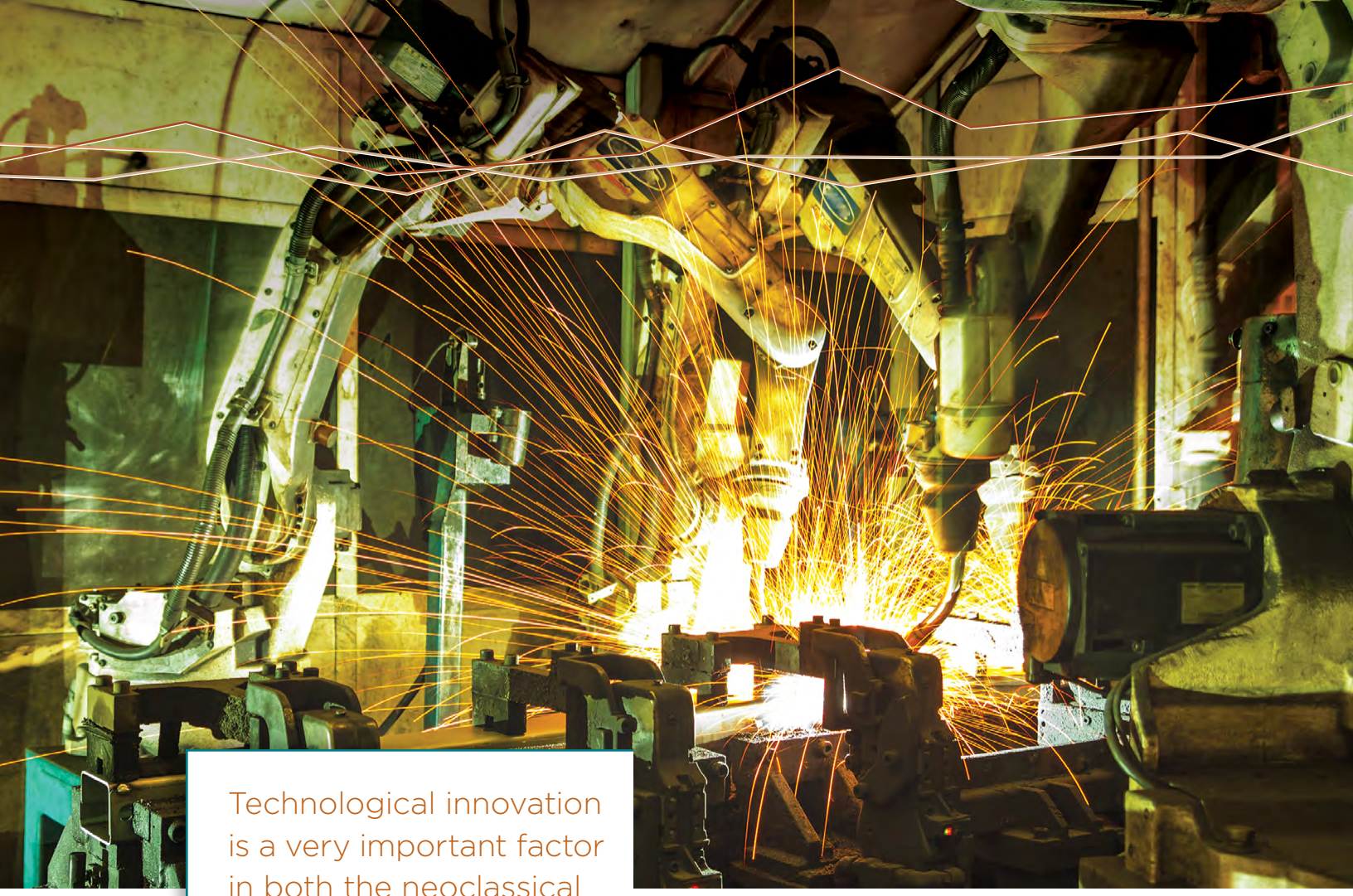
In addition to a slowing rate of innovation, Gordon, as noted before, argues that the U.S. economy faces four big headwinds. First, there's rising income inequality, which has reduced the share of economic gains going to the middle and working classes and with it their disposable income and purchasing power. Second, growth in educational attainment as measured by years of schooling completed has slowed and, among some parts of the population, decreased since 1970. In addition, the quality of primary and secondary education has become more stratified and the costs of higher education has increased. Such trends in education are themselves a contributor to the first headwind, growing income inequality. Third, the United States is experiencing significant demographic changes, most significantly many baby boomers are reaching traditional retirement age. That has reduced the number of hours worked per person. In addition, labor force participation among people who have not yet reached retirement age has dropped. Fourth, federal, state, and local governments face mounting debt, in large measure due to the aging of the population, as spending on "entitlement" programs such as Social Security and Medicare increases and pension obligations to public-sector employees grow. Gordon identifies two additional headwinds, which he thinks could be barriers to growth, though they are hard to quantify: "globalization," which could add to growing income inequality, and global warming and other environmental issues, which could require significant resources to address.[7]

All told, the slowing of innovation and the aforementioned headwinds suggest that the "outlook for future growth in the U.S. standard of living is not promising," Gordon writes. He doubts that "the standard of living of today's youths will double that of their parents, unlike the standard of living of each previous generation of Americans back to the late nineteenth century."[8]

In many ways, Cowen and Gordon have framed the issues surrounding the prospects for long-term economic growth in the United States quite well. In the next two sections, we discuss the ways economists have studied economic growth and its causes from the 1950s to the present. In sections four and five, we evaluate the arguments made for relatively slow long-run economic growth and discuss possible policy implications.

Accounting for Growth — The Neoclassical Model

In his speech accepting the Nobel Prize in December 1987, economist Robert Solow of the Massachusetts Institute of Technology noted that when he started thinking about economic growth, prevailing "theory, like much else in macroeconomics, was a product of the depression of the 1930s and of the war that finally ended it. So was I. Nevertheless it seemed to me that the story told by these



Technological innovation is a very important factor in both the neoclassical and endogenous growth models.

models felt wrong." In particular, Solow had in mind the work of the English economist Roy Harrod and the Russian-American economist Evsey Domar. The Harrod-Domar model maintained that steady economic growth at a constant rate required the national saving rate to be equal to the product of the capital-output ratio and the rate of growth of the labor force.[9] "Discomfort arose because they worked this out on the assumption that all three of the key ingredients… were given constants, facts of nature," Solow wrote.[10] But, in fact, all three are capable of changing at different rates at different times. This meant that an equilibrium growth path could be achieved only in rare circumstances. More often, the economy would be alternating between worsening periods of labor underutilization and long periods of growing labor shortage. Despite the severe effects of the Great Depression, American economic history did not fit this pattern. Solow looked to an alternative and in two papers in the 1950s[11] developed what came to be known as either the "Solow growth model"[12] or the "neoclassical growth model."

The Harrod-Domar model assumed that labor could not be substituted for capital in production. Solow removed this assumption and with it the "knife-edge notion of unstable balance" went with it. His model was quite elegant in its simplicity. Output was

determined by three factors: capital, labor, and technology. That measure of technology was later dubbed the "Solow residual" or "total factor productivity" (TFP) and includes a variety of things beyond technological progress, strictly speaking. And the evolution of labor and technology was taken as given.

The model has an important implication for long-run per capita growth: Since capital suffers from diminishing returns, capital accumulation can drive growth only in the short run, and, with no technological improvements, per capita output stagnates in the long run. So long-run growth (in output per worker) is due only to technological progress, or TFP, and that progress is exogenous, meaning it comes from forces outside the economic system. Early measurements done by Solow and others suggested that a very large share of growth was not driven by capital accumulation but by TFP. Indeed, Solow concluded that during the first part of the 20th century in the United States, about 80 percent of non-farm output growth was due to TFP.[13]

A line of the neoclassical growth literature in the late 1960s attempted to better understand and measure the factors of production. As New York Fed economist Kevin J. Stiroh has put it, economists working in this period "sought to develop better measures of investment, capital, labor, and other omitted inputs in order to reduce the magnitude of the unexplained residual."[14] That area of research enriched the neoclassical growth model and pioneering work was done by Dale Jorgenson and Zvi Griliches, then of the University of California, Berkeley and the University of Chicago, respectively.[15]

Growth theorists in the 1980s and 1990s built on the neoclassical model but changed an important assumption: In their models, technological growth was endogenous rather than exogenous. Endogenous technical change is change that is determined within the economic system, meaning that it is the consequence of the decisions and actions of people in the economy. Still, it is important to note that both neoclassical growth theorists and endogenous growth theorists focus on technology as one of the factors—if not the principal factor—driving long-run economic growth. Indeed, while one of the signal contributions of the neoclassical growth theorists was the development of tools that "enable us to measure the rate of technical change," Stiroh writes, the models of the endogenous "growth theorists provide an internal explanation for the sources of technical change."[16] Similarly, Harvard University economist Elhanan Helpman, himself a major contributor to the endogenous growth literature, notes that "there is convincing evidence that total factor productivity plays a major role" in accounting for cross-country variations in per capita income and patterns of economic growth. But while careful growth accounting can help us understand the relative "contribution of inputs and the contribution of total factor productivity, it does not unveil the causes of economic growth."[17]

Explaining Growth — The New Growth Theory

Among the implications of the neoclassical growth model is that economic convergence between countries would occur over time, with poorer countries catching up with richer

The Origins of Modern Economic Growth

In 1651, Englishman Thomas Hobbes famously described life as "solitary, poor, nasty, brutish, and short."[55] In many ways, he was right—certainly from today's perspective. But within about 100 years from the time of Hobbes' statement, the Industrial Revolution had started and then continued, in most economic historians' view, until about 1820 and 1840. The Industrial Revolution changed the world forever. From 1820 to present, GDP per person in Western Europe and the United States rose by more than a factor of 20, to about $26,000, estimates Stanford University economist Charles Jones.[56] But what gave rise to the Industrial Revolution and the massive increases in well-being it spawned? And is it true that economic growth, as has often been asserted, was virtually non-existent prior to it? The answer to the first question is: It's complicated. The answer to the second is: Probably not.

The Industrial Revolution, it seems pretty clear, was the result of innovation—in short, of ideas. As Northwestern University economic historian Joel Mokyr has argued, "The effective deployment of that knowledge, scientific or otherwise, in the service of production is the primary—if not the only—cause for the rapid growth of Western economies in the past centuries."[57] But that begs the question: Why? After all, people have been coming up with ideas forever.

Mokyr points to the Enlightenment of the late 17th centuries and 18th centuries. The ideas of this period, he argues, bridge the Scientific Revolution of Galileo, Descartes, and Newton with the Industrial Revolution of the mills and factories of Great Britain and continental Europe. In particular, the Enlightenment notions that economic growth and social progress can be achieved through knowledge—and that those things are desirable—were crucial to their actual attainment.[58] But it wasn't enough. Also necessary was what Mokyr calls the doctrine of "economic reasonableness," itself a product of the Enlightenment, and that was characterized by greater openness to trade, improved infrastructure, legal predictability and stability, and less distortionary taxation. Above all, it "redefined the role of the public sphere in the economic game, pointing to the delicate balance between those who lubricate the wheels of economic activity and those who manipulate them for their own profit. It recognized the possibility of what we might call today coordination failures and suggested policies to rectify them."[59]

Mokyr's story of why the Industrial Revolution occurred when it did is not the only plausible one offered by economic historians. But it has the virtue of also offering a plausible explanation of why economic growth was not, in fact, unheard of prior to the late 18th and early 19th centuries and also not confined to Great Britain. The latter idea was once controversial, as mentioned previously, but is less so today. Work by economists such as Roger Fouquet of the London School of Economics and Political Science and Stephen Broadberry of the University of Oxford, among others, seems to demonstrate that there was intermittent and localized growth in the Middle Ages, such as in the Netherlands in the 16th and 17th centuries and in Italy in the 14th century.[60] Indeed, that growth very likely made it possible for people to move to urban areas and into nonagricultural occupations. But none of the regions that experienced such progress previously ever switched from trade-based growth to technology-based growth. Trade-based growth remained vulnerable to setbacks and shocks, both natural, such as disease and disaster, and man-made, such as legal and institutional changes that hampered the expansion of commerce. In short, not only does the argument that ideas are a primary driver of economic growth seem compelling, so too does the argument that ideas helped make ideas-based growth possible.

countries. However, that is not observed in the data. While the cross-country variation in per capita wealth has been shrinking somewhat in recent decades, as some of the poorest countries in the world have made significant relative gains, there can be no doubt that the gap between what is generally considered the developed world and the developing world remains very large. This observation motivated economists Paul Romer, now of New York University, and Robert Lucas, of the University of Chicago, to, as Romer has put it, "drop the two central assumptions of the neoclassical model: that technological change is exogenous and that the same technological opportunities are available in all countries in the world."[18]

Lucas argued that if the same technology were available everywhere, resources, such as human capital, would not tend to move from where they are scarce to where they are plentiful and substantial differences in the level and growth of income would not persist. Yet both things are true. Lucas' theory is that there are "external effects" of human capital. Economists had long argued that improvements in a worker's human capital had "internal effects"—meaning benefits from building human capital accrued to the worker (and perhaps his or her family).[19] But Lucas, building on the work of sociologist and urban theorist Jane Jacobs,[20] posited that there were spillover effects associated with human capital. As Lucas succinctly noted: "Most of what we know we learn from other people."

Some of what we know comes through relatively formal channels, such as schooling. But some of it comes through less formal channels, meaning through observation, learning by doing, and the sharing of ideas among people working on similar problems. Lucas echoed Jacobs' argument that much of economic life is "creative" in a way that is similar to how we think of art or science being creative. "New York City's garment district, financial district, diamond district, advertising district and many more are as much intellectual centers as Columbia or New York University," Lucas wrote. "The specific ideas exchanged in these centers differ, of course, from those exchanged in academic circles but the process is much the same. To an outsider, it even *looks* the same: A collection of people doing pretty much the same thing, each emphasizing his own originality and uniqueness." Indeed, Lucas argued that the principal factor that can explain the dominant role of cities in economic life—why people and businesses cluster in relatively small geographic areas where land and housing is relatively expensive—are the benefits of external human capital.[21]

Lucas' work was complementary to work being done by Romer in a series of papers at roughly the same time.[22] Romer suggests that the evidence about growth that most economists have generally agreed to be true can be distilled to five facts. (1) There are many firms in a market economy. (2) Discoveries differ from other inputs in the sense that many people can use them at the same time. (3) It is possible to replicate physical activities. (4) Technological advance comes from things that people do. (5) Many individuals and firms have market power and earn monopoly rents on discoveries.[23]

According to Romer, the neoclassical model captured facts 1, 2, and 3 but left 4 and 5 largely unaddressed. Some

endogenous growth models, such as his own, "try to take the next step and accommodate fact 4." At the heart of Romer's work is the importance of ideas and their role in innovation and productivity improvements, which he argues is the prime driver of economic growth. Initially, it can be difficult to differentiate what Lucas refers to as the economy's "stock of knowledge" from Romer's focus on ideas. But there is an important difference in how they model the generation of new ideas or knowledge. In Lucas' formulation, technological progress is a byproduct of the economic decisions people make with regard to investment in physical and human capital. People make their decisions in a competitive environment, taking the current state of technology as given. But in the process of doing so, new things are learned about the production of goods and services, which advances the technological frontier.

By contrast, Romer focuses on the technological change that arises because of intentional actions of people responding to market incentives. That is, technology advances because people seek to profit from new ways of producing goods and services. To be sure, there are some people who come up with technological breakthroughs without any commercial applications in mind. But even in those cases, those innovations spur related innovations that do have market value. "Our initial understanding of electromagnetism arose from research conducted in academic institutions, but magnetic tape and home videocassette recorders resulted from private attempts by private firms to earn a profit," Romer notes.[24] In this regard, a country's institutions are crucial to providing the proper incentives for innovation and thus growth. Economist Daron Acemoglu of the Massachusetts Institute of Technology describes innovation-friendly regimes as "inclusive," meaning they have secure property rights, level playing fields, few barriers to entry for businesses and occupations, and basic public services and infrastructure. In addition, they have stable governments characterized by a broad distribution of political power so that authority can't be exercised in an arbitrary way.[25]

Particularly importantly, ideas are inherently nonrivalrous, meaning they can be used and built upon by multiple people simultaneously. Commenting on Romer's work, Stanford University economist Charles Jones provides a useful example: "If you add one computer, you make one worker more productive. If you add a new idea—think of the computer code for the first spreadsheet or word processor or even the internet itself—you can make any number of workers more productive."[26] Moreover, in a world of relatively fast transmission of ideas across space, ideas are no longer country or region specific. They can be "imported" from any part of the world fairly easily and cheaply.

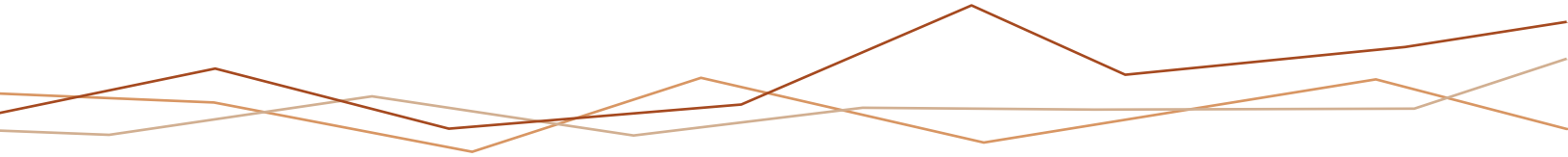
Romer then goes on to address fact 5, the existence of monopoly rents. Endogenous growth theorists working within the "Schumpeterian" framework, especially, have incorporated market power into their models.[27] These economists trace their work to Joseph Schumpeter, who noted the importance of technology in the 1930s and 1940s. He is best known for his book *Capitalism, Socialism, and Democracy,* and in particular his description of the "gale of creative destruction" as a "process of industrial mutation that incessantly revolutionizes the

As people work together on projects, sharing ideas, there are often spillover effects that enhance growth.

economic structure from within, incessantly destroying the old one, incessantly creating a new one."[28] They address the possibility that current innovators not only can exert positive knowledge spillovers on subsequent innovators, but can also drive out previous technologies (through what amounts to a process of creative destruction) and for short periods of time effectively earn monopoly rents.[29] Economists Philippe Aghion of Harvard University and Peter Howitt of Brown University argue that Schumpeterian models are generally "consistent with the empirical evidence on growth accounting, as in the neoclassical model." But like other theories of endogenous growth, "the causal explanation that it provides for economic growth is quite different from that of the neoclassical model." In short, neoclassical theory "can be seen as a special case of modern endogenous growth theory, the special limiting case in which the marginal productivity of efforts to innovate has fallen to zero."[30]

Thinking About the Future

Thus far, we have looked at the argument some economists have recently made that economic growth in the United States is likely to remain below historical trends for some time, provided a brief overview of the



neoclassical growth theory that was developed in the 1950s, and then looked at how the neoclassical model has been built upon by endogenous growth theorists in the 1980s and beyond. Given what we know from both theory and evidence, how should we evaluate the "new normal" hypothesis regarding sluggish future U.S. growth?

Gordon presents a plausible outlook. It is true that TFP growth associated with the digital revolution—or, again, as he puts it, IR #3—appears to have been relatively short lived relative to TFP growth associated with IR #1 and IR #2. During IR #2, 1920 to 1970, the annualized rate of TFP growth was 1.89. From 1970 to 1994, that number slipped to 0.57. It rebounded to 1.03 from 1994 to 2004, but then fell to 0.40 from 2004 to 2014. His interpretation for the rise from 1994 to 2004 and the drop thereafter is fairly straightforward: The introduction of the personal computer in the 1980s did not generate major productivity gains until the "invention of the Internet, web browsing, search engines, and e-commerce produced a pervasive change in every aspect of business practice."[31] However, those changes have largely been exploited and we are unlikely to see major additional changes from those technologies—and the prospect for new technological development that was as revolutionary as what we saw in the middle of the 20th century is unlikely. Yes, we will see more ingenuous apps for our mobile devices but, as he frequently quips in public lectures, "What would you rather have: your iPhone or indoor plumbing?"

Arguably the biggest problem with Gordon's analysis is that trying to predict the future is inevitably fraught with trouble. That is true in nearly every aspect of life. But it is perhaps particularly true when it comes to predicting innovation, which as we know comes in fits and starts and is hard to forecast.

Gordon's colleague at Northwestern, economic historian Joel Mokyr, argues that there are many areas of science in which significant discoveries seem promising, among them molecular microbiology, astronomy, nanochemistry, and genetic engineering. And while it is true that there is no automatic mechanism that turns better science into improved technology, "there is one reason to believe that in the near future it will do so better and more efficiently than ever before. The reason is access." Meaning, searching for vast amounts of information has become fast, easy, and nearly costless for researchers. Not only is the era of "Big Data" here but the ability to parse through the most arcane of data is no longer burdensome for people working on the frontiers of knowledge.

On the question of whether all the low-hanging fruit has been picked, Mokyr argues that the analogy is flawed. As he puts it, science "builds taller and taller ladders, so we can reach the upper branches, and then the branches above them." In other words, when a technological solution for a problem is found it often creates a new problem, which creates a new problem, and so on. "Each solution perturbs some other component in the system and sows the seed of more needs; the 'demand' for new technology is thus self-sustaining."[32]

Acemoglu is in general agreement with Mokyr on this point. The "macropicture is clear: there is little evidence we are running out of innovations," he writes. "This is not only because there are literally millions of

ideas that can be recombined into new ones to generate new processes and products, but also because every innovation poses new problems and opens the way for yet more innovations." In addition, he argues that in societies with good governance, market signals are sent to innovators to guide their work toward areas where societal benefits are large. As an example, he points to the U.S. pharmaceutical industry, where the production of drugs aimed to address problems faced by aging baby boomers has increased and the quality has improved.[33]

Insofar as there is a threat to technological advance, it is arguably not from a secular drying up of ideas but rather a shift from inclusive institutions that encourage and reward ingenuity and provide social stability toward extractive institutions that do just the opposite.[34] Still, while it is no doubt true that there are improvements to institutions that U.S. policymakers should consider (which we will address in the next section), there is little reason to think that the United States is heading from a system of broadly inclusive institutions to broadly extractive institutions. Also, while there are still far too many people in the world who live under regimes whose institutions, in the main, could be described as extractive, the broad trend is toward more liberalization across the globe, thus unleashing the potential of their citizens—people whose ideas will benefit not only them and their neighbors but people thousands of miles away.

What's more, even if we accept Gordon's hypothesis that technological growth is slowing and is likely to remain sluggish, as measured by TFP, that doesn't necessarily mean that we should discount the importance of recent innovations to human well-being. Princeton University economist Angus Deaton has made this point in an elegant essay that is worth quoting at length:

> I…challenge the proposition that the information revolution and its associated devices do little for human well-being. Many have documented the importance of spending time and socializing with friends and family, but this is exactly the feature of everyday life that the new communication methods work to enhance. All of us can remain in touch with our children and friends throughout every day, videoconferencing is essentially free, and we can cultivate close relationships with people who live thousands of miles away. When my parents said good-bye to relatives and friends who left Scotland to look for better lives in Canada and Australia, they never expected to see or talk to them again, except perhaps for a brief and astronomically expensive phone call when someone died. Today, we often do not even know where people are physically located when we work with them, talk to them, or play with them. We can also enjoy the great human achievements of the past and the present, cheaply accessing literature, music, and movies at any time and in any place. That these joys are not captured in growth statistics tells us about the growth statistics, not about the technology. If they are belittled by those who do not use them, it tells us only to pay no attention to those who purport to use their own preference to pass judgments on the pleasures of others.[35]

Relatedly, Deaton notes that broader societal trends are making life better for millions of people. Whether these can be tied to technological improvements is tenuous in some cases, less so in others. For instance, violence has fallen. From 2005 to 2014, the violent crime rate in the United States

fell 22.1 percent.[36] That is clearly important for those who otherwise would have been victims of violence, but it is also important for those who potentially could be subject to violence, as they are able to live with less fear and insecurity. Arguably, technological advances have improved policing of crime as well as the collection and processing of evidence that in the past would have been of little use to investigators, benefiting victims of crimes and those falsely accused. Reducing violent crime is an area where there remains room for further progress, with the potential for considerable improvement in people's lives.

On balance, there is reason to be sanguine about the prospects for future technological innovation. There is also reason to celebrate recent innovations that may not immediately appear as fundamentally transforming as, say, the development and widespread use of automobiles during the middle part of the 20th century, but that have still brought great gains to millions of Americans and billions of people worldwide, gains that arguably are not fully captured in many standard measures of well-being. It would be rash to attempt to predict with precision the pace at which future innovation will take place or how important those innovations will be, but it would also be premature to say that America's best days are behind us and that future generations will not live much better than we do today.[37] In the next section, we will raise several policy issues that might be addressed to help provide an environment in which innovation can continue to occur and economic growth can be robust. We acknowledge that some of these ideas may be difficult to achieve politically and that some could have adverse economic consequences for segments of the population. Insofar as the latter is true, policymakers may wish to consider ways to compensate those who are made worse off.

Implications for Policy

Perhaps the first thing that policymakers ought to acknowledge when confronting policy issues aimed at boosting innovation and economic growth is that there are factors related to long-term economic growth that are largely beyond their control. One of them is the domestic birth rate. A fact that seems to hold true across nearly all countries is that as they get richer, the fertility rate declines. In 2013, University of Chicago economist Gary Becker estimated that more than 80 countries have fewer births annually than are required to replace the number of individuals who die each year, including every country in Western Europe, China, Japan, Russia, and Canada.[38] In the United States, the fertility rate was only slightly above the replacement rate. The United Nations predicts that many of these countries will have smaller populations in 2050 than they do today.[39]

Such trends have significant economic implications. As noted in the introduction to this essay, Gordon argues that demographic trends are one of the four major "headwinds" that the U.S. economy faces. In particular, the declining fertility rate (accompanied by lower overall labor force participation) will make it more difficult to fund entitlement programs such as Social Security and Medicare, which depend on payroll taxes to distribute benefits.

In the neoclassical model, declining population has a very clear and direct effect

on output. As the amount of labor falls, so does output. In endogenous growth models, population has the same direct effect on labor input, but many also feature an indirect effect. Growth in such models is largely a function of ideas, and the more people in a country, the more ideas they will create. As Charles Jones argues:

> First, just as the total output of any good depends on the total number of workers producing the good, more researchers produce more ideas. A larger population means more Mozarts and Newtons, and more Wright brothers, Sam Waltons, and William Shockleys. Second, the nonrivalry of knowledge means that per capita output depends on the total stock of ideas, not on ideas per person. Each person in the economy benefits from the new ideas created by the Isaac Newtons and William Shockleys of the world, and this benefit is not degraded by the presence of a larger population.[40]

So how might policymakers address the issue of declining fertility rates in the United States? As noted above, this seems to be an issue that is largely out of their control, at least directly. One could imagine schemes that would subsidize births but, as Becker, who viewed population growth as a net positive, argued, those programs can be expensive and hard to administer.[41] An obvious alternative to domestic population growth is to look abroad and effectively import ideas through more liberalized immigration policies. Consistent with Lucas' theory of economic growth, people can be more productive when placed in close proximity to others, jointly working on projects, than in isolation, though arguably the importance of proximity has declined somewhat as long-distance communication has improved and become cheaper. Policies that would increase the level of skills by making it easier for workers to come to the United States would benefit the immigrants themselves and native-born Americans, on average.[42]

Closely tied to the issue of immigration is that of trade. Since at least the publication of *The Wealth of Nations* by Adam Smith in 1776,[43] economists have generally been supportive of liberal trade policies. Such policies permit countries to specialize in the production of goods where they have a comparative advantage, as classical economist David Ricardo noted,[44] leading to an increase in output per worker. But Romer points out that the benefits of trade extend beyond increasing the efficiency of the production of goods that already exist. Trade also introduces new or improved types of goods and services from abroad.[45]

Similarly, economist Gene Grossman of Princeton University and Elhanan Helpman posit a theory of integration and growth, where trade may help the process of technological dissemination if foreign exporters suggest ways that their goods can be used more productively or foreign importers indicate how local products can be made more attractive to consumers in their country. In addition, exposure to international competition may mitigate redundancy in industrial research. "Whereas a firm that develops a product for a protected domestic market need only make use of technologies that are new to the local economy," they write, "one that hopes to compete in the international marketplace will be forced to generate ideas that are truly innovative on a global scale."[46] The United States ought to act on the

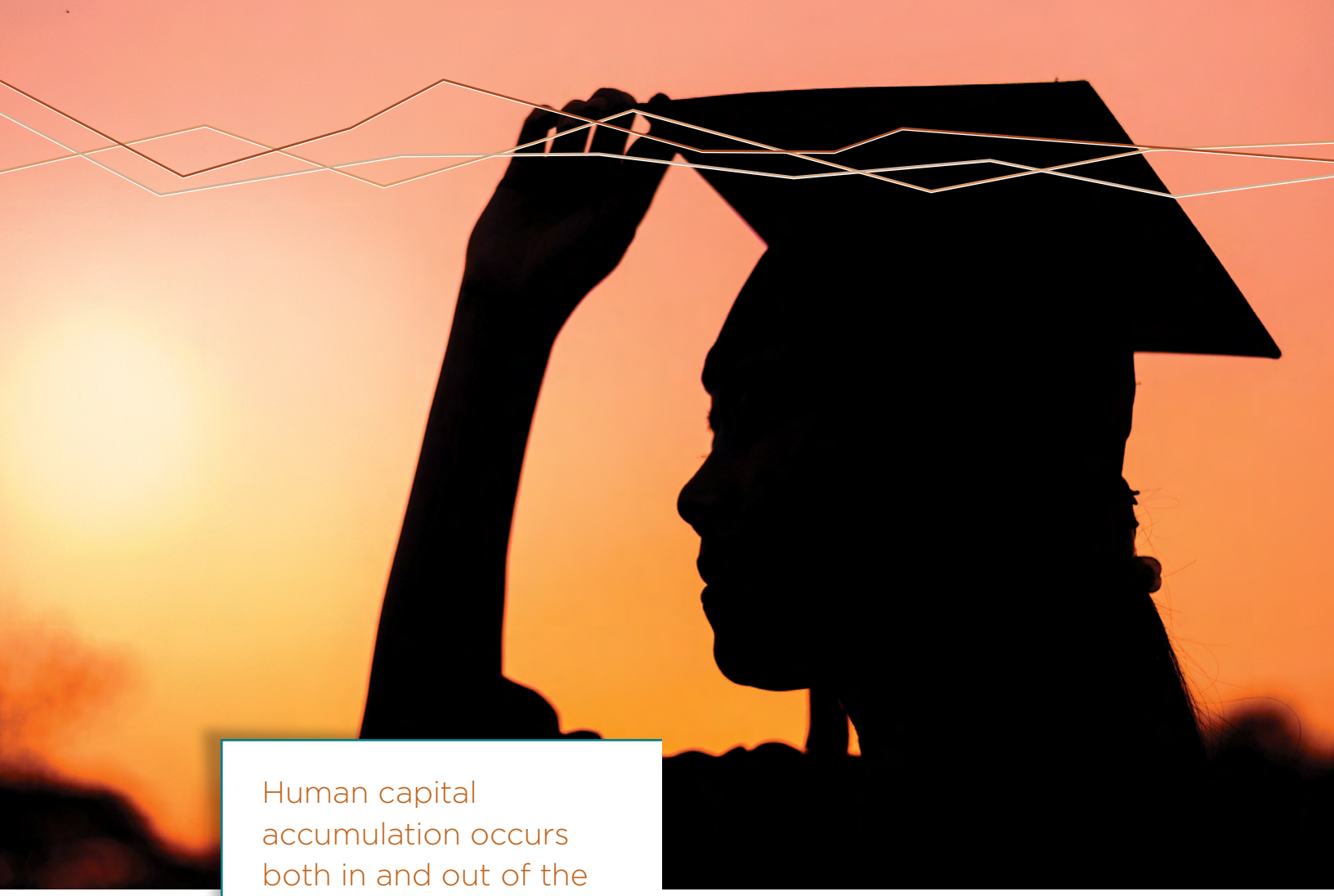
presumption that just as competition within a country improves efficiency and its citizens' welfare, so too does trade between countries. Thus, policymakers ought to be wary of imposing barriers that would impede such transactions and make most people worse off than they otherwise would be.[47]

Education is also clearly important to the future of economic growth in the United States. The building of human capital, as we have seen, brings with it gains to the person who has acquired skills as well as the economy as a whole. In addition, universities tend to be incubators for ideas, some that have no obvious immediate commercial application and others that do. How to "fix" America's educational system, particularly at the elementary and secondary levels, is a perennial topic of debate and, while there is merit in focusing on specific proposals that deal with, say, how to construct curricula, we would like to discuss a few broader principles.

First, it appears that there are significant returns to early childhood education. Skills that are acquired early in life tend to build on each other over time.[48] Second, we ought to take a broad view of what we mean when we use the term "skills." Some of these may not be easily measurable through standardized tests but seem to have important long-run effects. For instance, noncognitive skills such as following instructions, patience, and work ethic can lay the foundation for mastering more complex cognitive skills later in life.[49] Third, we ought not take a one-size-fits-all approach to education. It is true that, on average, a college degree brings with it significant monetary returns over the course of a person's life. But that does not mean that all students should be guided toward college. For those who are unsure whether college is right for them, the choice to go can be costly in terms of foregone earnings and also bring with it substantial debt, while at the same time yielding little in improved earnings if they do not complete their degree. People who have some college but have not attained a degree earn only about 15 percent more than their peers with only a high school degree. This is particularly important when we consider that the college dropout rate is roughly 40 percent.

It should also be noted that the high school dropout rate nationwide is roughly 20 percent, but in many of our major cities that number rises above 50 percent. What's more, many of those students often go to school in fear for their safety and, if they do graduate, do not have the same skills, on average, as their peers in suburban or private schools. This feeds inequality and raises a host of troubling questions about social equity. Improving access to good educational opportunities for students in urban areas in principle should be an example of "low-hanging fruit." How we harvest that fruit, however, has proven to be a difficult issue to address. The pursuit of better solutions will, and should, continue, not only because it may improve aggregate economic performance but also because it is important to bettering the lives of some of our country's most disadvantaged citizens.[50]

The cumulative effects of economic regulation appear to be exerting a drag on the U.S. economy. While some regulations—for instance, those that require firms to effectively internalize the costs they impose on others—arguably promote both efficiency and equity, many regulations serve little



Human capital accumulation occurs both in and out of the classroom and benefits individuals and the economy overall.

aggregate economic purpose but instead deliver concentrated benefits for certain groups, often by helping to protect them from competition.[51] Robert Gordon dubs these barriers to entry as "regressive regulation" and identifies excessive monopoly privileges granted under intellectual property law, protection of incumbent service providers through occupational licensing, and artificial scarcity through land-use regulation as areas ripe for reform.[52]

The policy considerations discussed here lie mostly beyond the responsibility of the central bank, and monetary policy in particular. It is true that monetary policymakers need to be attentive to the forces shaping long-run growth. Different underlying rates of growth imply differences in the general level of interest rates—rates will tend to be lower in a more slowly growing economy. Accordingly, expectations about average growth rates going forward will be one of the factors that influence policymakers' assessments of the appropriate setting of their short-term interest rate instrument. But in terms of the influence of monetary policy on growth, the most important contribution is to provide an environment of macroeconomic stability that is friendly to innovation and growth. Similarly, the Federal Reserve's role in the regulation of financial intermediation—in particular, permitting firms to

borrow, lend, and innovate, while guarding against excessive risk-taking—is important to the maintenance of a sound financial sector, without which economic growth is difficult.[53]

In sum, there can be little doubt that the U.S. economy does face some significant challenges. However, the "new normal" is far from a given. The prospects for continued innovations that improve measured as well as unmeasured standards of living remain stronger than the skeptics maintain. And there are policy areas that, if addressed thoughtfully, likely could yield improvement in economic performance and human welfare.[54] It might be hard for many people to imagine the U.S. economy growing like it did in, say, the 1950s, but how many Americans in 1930 would have thought that the rest of the 20th century would have produced such massive gains for such a huge swath of the population? ■

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ENDNOTES

1 See El-Erian (2010) and Lagarde (2014).

2 See Jorgenson, Ho, and Samuels (2014).

3 Cowen (2011, 7).

4 It should be noted that in his 2013 book *Average Is Over*, Cowen considers himself more optimistic about U.S. economic growth over the long run, though he worries that the distribution of its benefits will be highly uneven depending on the relative skill levels of workers.

5 Gordon (2016, 1).

6 Gordon (2016, 566–579).

7 Gordon (2016, 605–639).

8 Gordon (2016, 21–22).

9 While called the Harrod-Domar model, the model is the product of independent work by each of the authors, in particular Harrod (1939) and Domar (1946).

10 Solow (1988, 307–308).

11 Solow (1956) and Solow (1957).

12 The Solow growth model is sometimes referred to as the "Solow-Swan growth model," as Australian economist Trevor Swan developed similar ideas roughly contemporaneously (Swan 1956).

13 Solow (1957, 314–316).

14 Stiroh (2001, 41).

15 Jorgenson and Griliches (1967).

16 Stiroh (2001, 2).

17 Helpman (2004, 26–33).

18 Romer (1994a, 4).

19 As Lucas, Romer, and others were developing endogenous growth models, in which human capital played an important role, economists Gregory Mankiw, David Romer, and David Weil of Harvard University, the University of California, Berkeley, and Brown University, respectively, sought to augment the neoclassical model by including accumulation of human capital as well as physical capital and argued that this change produced results that were consistent with many of the implications of the neoclassical model. See Mankiw, Romer, and Weil (1992).

20 Jacobs (1969) and Jacobs (1984).

21 Lucas (1988, 35–38).

22 See Romer (1986), Romer (1987), and Romer (1990).

23 Romer (1994a, 11–17).

24 Romer (1990, S72).

25 Acemoglu (2013, 15–16).

26 Jones (2015a, 1).

27 Two foundational papers in Schumpeterian growth theory are Grossman and Helpman (1991b) and Aghion and Howitt (1992). For a useful overview of Schumpeterian growth models, see Aghion, Akcigit, and Howitt (2014). Solow is less enthusiastic about Schumpeter's contributions. He writes that Schumpeter is viewed as a patron saint among some endogenous growth theorists and that he should be treated as such: "paraded around one day each year and more or less ignored the rest of the time (Solow 1994, 52)."

28 Schumpeter (1942, 83).

29 In Schumpeterian growth models, the legal protection of intellectual property rights (IPR), which too can be seen as a form of temporary monopoly power, is generally considered crucial to induce innovation because it permits innovators to reap financial benefits from their work. Daron Acemoglu of the Massachusetts Institute of Technology and Ufuk Akcigit, now of the University of Chicago, for instance, have developed a dynamic framework to study the interactions between IPR and competition. They argue "that protection given to companies with significant technological leads over their rivals also dynamically incentivizes companies with more limited technological leads—as further innovation will not only increase their productivity but also grant them additional IPR protection. This new effect implies that optimal IPR policy should be state dependent and provide greater protection to companies with significant technological leads and only limited IPR protection for those without (Acemoglu and Akcigit 2012, 38–39)." As we shall see later in this essay, though, some economists and policy analysts believe that IPR protection is excessively restrictive and liberalization would be good for growth. Notably, Michele Boldrin of Washington University and David Levine of the University of California, Los Angeles believe that IPR, on net, are harmful to economic growth and should be eliminated. See Boldrin and Levine (2002) and Boldrin and Levine (2009).

30 Aghion and Howitt (2007, 80).

31 Gordon (2016, 575–576).

32 Mokyr (2013).

33 Acemoglu (2013, 25–26).

34 For a cross-country examination of institutional characteristics—such as the rule of law, predictable and relatively modest regulation, and efficient provision of public services—and their importance for economic development and growth, see La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1999).

35 Deaton (2013, 41).

36 Federal Bureau of Investigation (2015).

37 It is worth noting that it is possible that some technological advances—what might be thought of as new and often general purpose technologies, as opposed to incremental innovations—might actually slow economic growth for a period as firms learn how to make use of those technologies, but then contribute to faster economic growth over time as they are incorporated into production practices. See Hornstein and Krusell (1996).

38 Becker (2013).

39 United Nations (2015).

40 Jones (2005, 1073). This line of argument has a long pedigree. In 1968, a time when many social scientists were worried about overpopulation causing enormous societal problems, Columbia University economist Edmund Phelps argued: "One can hardly imagine, I think, how poor we would be today were it not for the rapid population growth of the past to which we owe the enormous number of technological advances enjoyed today. ...If I could re-do the history of the world, halving population size each year from the beginning of time on some random basis, I would not do it for fear of losing Mozart in the process (Phelps 1968, 511–512)." Similarly, University of Maryland economist Julian Simon argued that people were the "ultimate resource" in numerous popular writings and, most comprehensively, in *The Ultimate Resource 2* (Simon 1998). Michael Kremer, a development economist at Harvard University, has looked empirically at the relationship of population growth and technological progress from the prehistoric period to 1900. He concludes that technological growth has been higher when population has been larger, including in places that were isolated physically from other parts of the world, such as during the period between the melting of the polar ice caps, which eliminated land bridges, and Europeans' reestablishment of contact with North America. He also develops a model in which technological change is not necessarily dependent on the presence of genius producing sharp one-time gains but instead on continuous acceleration. See Kremer (1993).

41 Becker (2013).

42 There is also a strong case for liberalizing immigration policies for lower-skilled workers, both on ethical and efficiency grounds, but that argument is beyond the scope of this essay.

43 Smith (1776).

44 Ricardo (1817).

45 Romer (1994b, 25).

46 Grossman and Helpman (1994, 40). It should be noted that Grossman and Helpman have also constructed examples where closing off trade might also increase a country's long-run growth rate. For example, a country that has a relative abundance of natural resources and unskilled labor may be induced by trade to specialize in activities that make use of those activities and forego human-capital-intensive activities that would result in the development of new technologies, thus reducing the pace of non-agricultural output. See Grossman and Helpman (1991a, 237–257). But they add: "These arguments should not be taken to imply that illiberal trade policies would generally be beneficial to a country that sees slower growth as a result of openness to trade. A country that lacks the size and technological experience to support a world class R&D effort, or one that has the endowments appropriate to activities like agriculture or mining, typically will gain from specializing in the production of goods that do not require the latest technologies (Grossman and Helpman 1994, 41)."

47 It is true that liberal trade policies do produce some net losers. For instance, those people formerly employed in industries that are now partly or largely located in other countries may be worse off due to international trade. But rather than trying to restrict the free flow of ideas and goods—and thereby blunt the substantial economic benefits that result—a more desirable alternative, insofar as any action is taken, would be to provide financial compensation for those who have been economically harmed. Economist Earl Grinols, now of Baylor University, provides an overview of the merits of different policies that would achieve that end in Grinols (1996).

48 Heckman (2008).

49 Bowles, Gintis, and Groves (2008).

50 Students in urban areas also are disproportionately likely to be raised in single-parent homes or homes with significant dysfunction. There is compelling evidence that this, too, contributes to lower lifetime earnings as well as, for example, higher incarceration rates. See Schwartz (2005) and Lerman and Wilcox (2014). Policymakers ought to focus on what can be done to address such problems—including, perhaps most of all, the elimination of policies that inadvertently foster them. Gordon (2016, 644–646) offers some thought-provoking suggestions in this regard.

51 Mancur Olson explains this dynamic in *The Logic of Collective Action: Public Goods and the Theory of Groups* (Olson 1965).

52 Gordon (2016, 649). Brink Lindsey of the Cato Institute makes a similar argument but includes restrictions on high-skilled immigration under the "regressive regulation" rubric as well: "[A]ll these entry barriers undermine economic growth by restricting vital inputs to innovation. Copyright and patent protections restrict the recombination of ideas that is the essence of innovation by making some ideas artificially inaccessible. Immigration laws restrict the inflow of highly skilled individuals who are disproportionately entrepreneurial and innovative. Occupational licensing restricts the formation of new businesses, which frequently are the vessels of new products or new production methods. And zoning restricts urban density, a vital catalyst for the innovative recombination of ideas (Lindsey 2015a, 28)."

53 Using data from 80 countries during 1960–89, economists Robert G. King and Ross Levine, then of the University of Virginia and the World Bank, respectively, provided evidence that the level of financial development is strongly associated with real per capita GDP growth, the rate of physical capital accumulation, and efficiency improvements in the use of physical capital. See King and Levine (1993).

54 For a thoughtful discussion of many other policy areas where reform might be helpful to long-term growth, see Lindsey (2015b).

55 Hobbes (1651).

56 Jones (2015b, 4).

57 Mokyr (2005, 287).

58 Mokyr (2005, 288–290).

59 Mokyr (2005, 336–337).

60 See Fouquet and Broadberry (2015) and Goldstone (2002).

Fifth District Expansion Continued in 2015

Introduction

Overall, 2015 was a year of economic expansion in the Fifth District. Labor markets tightened in most areas, with the notable exception of West Virginia, where job losses were largely related to the state's energy sector. The tightening labor markets in the rest of the District resulted in firms reporting upward pressure on labor costs and increased difficulty finding qualified workers. An area of the economy with the most pronounced labor challenges was construction, where activity picked up in both residential and commercial real estate. Reports on manufacturing and transportation were a little more mixed across the year; some firms benefited from the lower commodity prices and the appreciating dollar, although export activity declined. Retail and non-retail service sector firms continued to experience improved sales to a generally more confident consumer.

Labor Markets

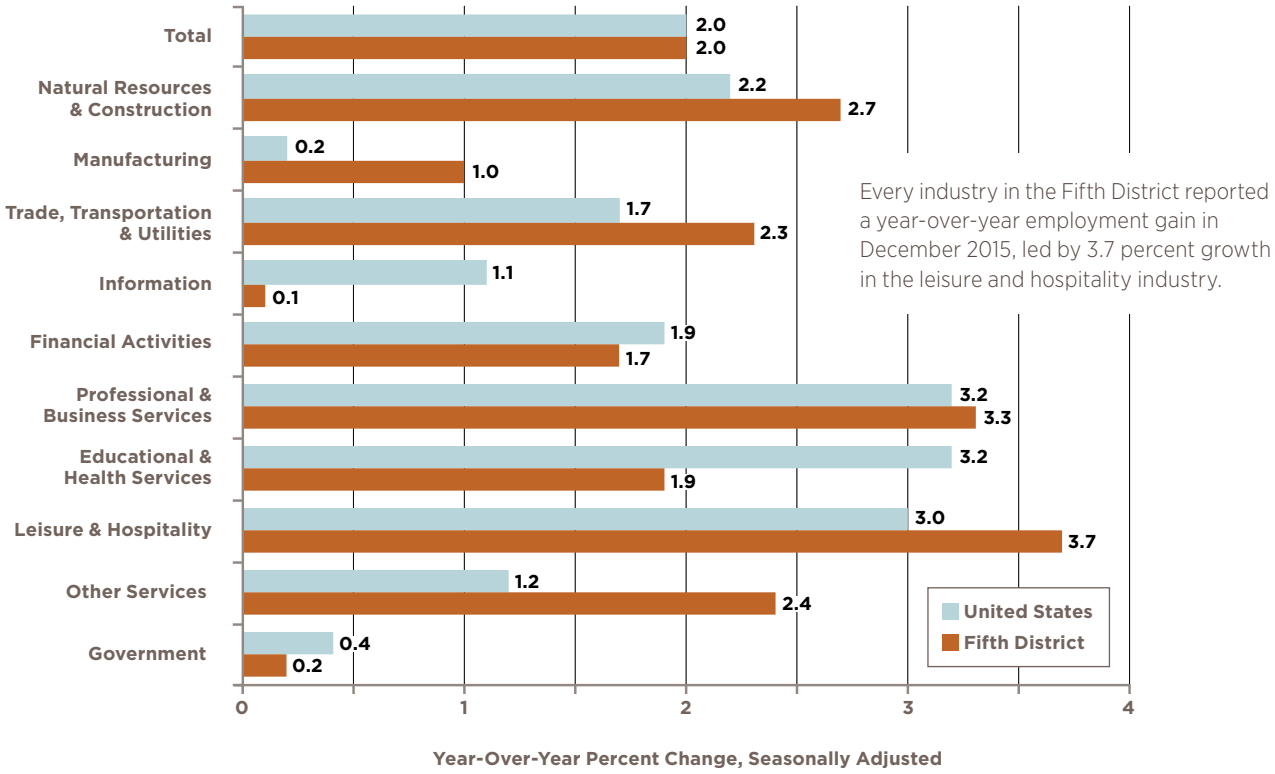
Labor markets in the Fifth District generally strengthened over the year. Total employment in the District grew 2.0 percent (284,000 jobs) in 2015 as every jurisdiction except West Virginia added jobs. South Carolina reported the largest year-over-year growth in the District of 2.8 percent, which outpaced the national rate of 2.0 percent. Job growth in North Carolina and Virginia met or exceeded the national expansion, while the District of Columbia and Maryland posted slower growth (1.0 percent and 1.6 percent, respectively). In West Virginia, employment declined; the most notable contributor to the 1.3 percent contraction was the natural resource and mining industry, which shed 5,500 jobs (19.1 percent) over the year.

In the District overall, every industry reported a year-over-year employment gain with the most jobs—72,300 (3.3 percent)—added in the professional and business services industry. The professional and business services industry was the largest contributor to the net job gain in North Carolina, South Carolina, and Virginia. In both D.C. and Maryland, the industry was the second-largest contributor behind leisure and hospitality. In West Virginia, the professional and business services industry contracted on a year-over-year basis, as did most industries in that state.

The unemployment rate in the Fifth District declined from 5.6 percent to 5.1 percent in 2015, closely mirroring the improvement in the national rate that declined from 5.6 percent to 5.0 percent over the year. Unemployment rates declined in every District jurisdiction over the year. The largest improvement occurred in South Carolina, where the rate fell 1.1 percentage points to 5.5 percent. The District of Columbia ended 2015 with the highest unemployment rate in the Fifth District, despite decreasing 0.9 percentage point over the year. Meanwhile, the labor force in the District rose steadily over the course of 2015 but grew more slowly than the civilian population and, as a result, the labor force participation rate declined from 62.6 percent to 62.5 percent.

Employment Growth by Industry

Percent Change from 2014



Every industry in the Fifth District reported a year-over-year employment gain in December 2015, led by 3.7 percent growth in the leisure and hospitality industry.

Source: Bureau of Labor Statistics, Haver Analytics

Anecdotes from across the Fifth District indicated a tightening labor market, with certain exceptions such as coal mining in West Virginia. Demand for workers at all skill levels reportedly expanded in 2015, particularly in information technology, manufacturing, and construction. Certain occupations were also cited regularly throughout the year, including: health care workers, engineers, truck drivers, accountants, and hospitality workers. Over the course of the year, the accounts of upward wage pressures increased, particularly for those positions that were in the most demand.

Business Conditions

Reports on manufacturing activity were mixed during 2015. The Federal Reserve Bank of Richmond maintains a composite manufacturing index based on the Bank's *Fifth District Survey of Manufacturing Activity*. It is a diffusion index, meaning that a positive reading indicates that the share of firms reporting expansion exceeds the share of firms reporting contraction. The diffusion index spent most of the year close to zero, although the summer months were a bit stronger. Toward the end of the year, not only did the index indicate slowing activity, but

several manufacturers commented that slowing global demand and the appreciating dollar had negatively impacted business activity. That sentiment was not expressed universally, however, as other manufacturers indicated a pickup in activity over the same period, particularly manufacturers of metals, automobiles, and auto parts. Further, in every month of the year, the survey measure of raw materials price growth was lower than in the same month of 2014, which was consistent with persistent reports of low commodity prices from manufacturing contacts. The survey's index for number of employees and the index for wages were consistently positive in 2015.

Data on Fifth District port activity were consistent with the reports of slowing exports of manufactured goods. Export activity out of the Charleston, S.C., port, for example, started the year strong but slowed some in the fall and winter months. In fact, District exports of most goods categories declined from the prior year, with the notable exception of transportation equipment, which includes automobile and aerospace vehicles and parts. The Norfolk, Va., port reported export declines beginning in the spring of 2015 and the Baltimore, Md., port continued to report declining exports. Import activity, on the other hand, grew fairly steadily over the year across Fifth District ports.

According to the *Federal Reserve Bank of Richmond Service Sector Survey*, retail activity strengthened throughout most of the year. The survey index for retail revenues was relatively high by historical standards until the last two months of the year. On the other hand, comments from retailers in the District indicated a continued trend toward online shopping, particularly around the holidays, which negatively affected brick-and-mortar retailers in the District. This trend could be manifesting itself in the softer readings for the November and December shopper traffic index.

Non-retail services firms reported steady improvements over the year. The survey measure of revenues for those businesses remained above zero throughout the year, with particularly high index values in July and August. Anecdotes from services firms during those months indicated a boost from tourism as well as strength in software, transportation, and temporary employment services. Similar to retail firms, non-retail services experienced a slowdown in the last two months of the year. There were a few comments about sluggish activity in wholesale trade, real estate services and construction, legal services, and tourism.

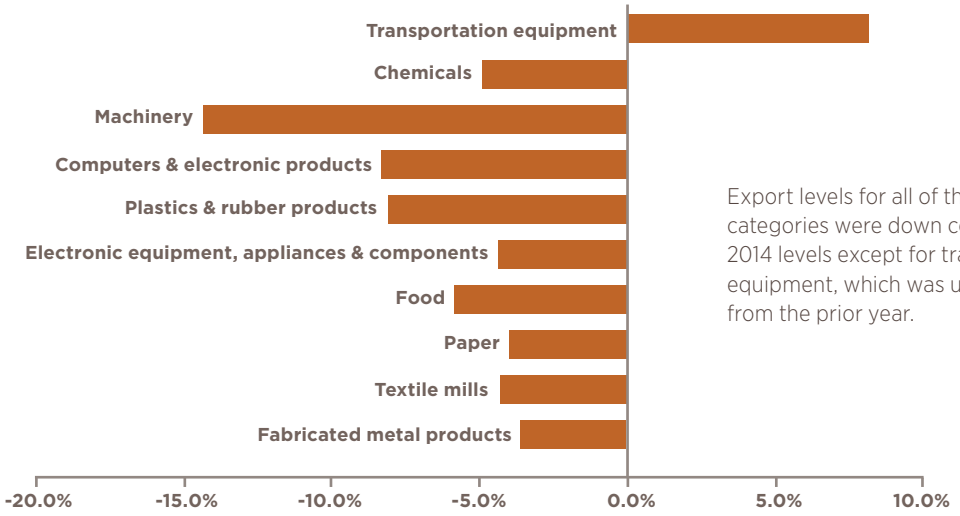
Like the manufacturing sector, the survey measures of employment and wages also indicated continued improvement in the service sector. The non-retail services employment index maintained a value well above zero for the majority of the year, while the retail index started the year strong, although it dipped below zero a few times in 2015, commonly during the fall months. The indexes for wages were consistently positive throughout the year. Moreover, the retail index for wages hit a 10-year peak in October 2015.

Real Estate

In 2015, Fifth District housing markets continued the slow and steady improvement that has characterized the industry for a few years. According to CoreLogic Information Solutions, District house prices grew 2.8 percent over the course of the year. Home values appreciated in every District jurisdiction except Maryland, with the strongest growth coming from the 6.6 percent price

Ten Largest Fifth District Export Categories in 2015

Percent Change from 2014



Source: The Census Bureau via WISER, Haver Analytics

growth in South Carolina. In the second half of 2015, North Carolina's house price index exceeded its pre-recession high, becoming the second jurisdiction in the Fifth District to do so (D.C. crossed that threshold in January 2013). Reports from real estate agents generally noted rising home sales and prices, reduced days on market, and low inventory levels. One exception was Maryland, where many contacts still reported sluggish activity. Meanwhile, distressed inventory levels shrank as the number of mortgages in foreclosure or with payments more than 90 days late continued to decline in 2015 across the District.

Residential construction activity picked up in 2015 after many years of lagging the improvement in other housing indicators. However, there were reports of constraints on growth such as lot shortages, regulatory delays, and difficulty finding construction workers. Activity in rental markets strengthened as well, with several comments citing continued expansion in multifamily construction. Permitting activity, although volatile, generally supported the anecdotal information. The total number of housing permits issued in 2015 exceeded the prior year by 5.5 percent. Permits for single-family homes, which account for about 70 percent of total permits in the Fifth District, grew 7.1 percent while multifamily permitting grew 2.0 percent.

Commercial real estate activity varied by location but generally expanded in 2015 as well. Particular strength was noted in the construction of multifamily housing, industrial space (particularly data centers and warehouses), hotels, health care facilities, and grocery-anchored retail projects. Reports from the office segment were more mixed, with some mention of high inventory levels and a decreased need for square footage, while other markets reported rising rents and

increased absorption. Similarly to residential construction, builders noted increased difficulty finding labor, which drove up costs in some areas.

Banking Conditions

Despite the challenges of adapting to an evolving banking environment, Fifth District banks continued to grow during 2015 while exhibiting stable profitability and improving credit quality.

Though the challenges of a continued low-rate environment and costs associated with technological innovations and new regulatory requirements has inhibited widespread profitability from rebounding back to pre-financial crisis levels, Fifth District earnings over the course of 2015 remained stable with median return on average assets (ROAAs) of 0.70 percent. Despite the low interest rate environment weighing on banks' net interest margins, a little over half of the District banks showed improving ROAAs year over year. Overall, 92.7 percent of Fifth District banks were profitable at year-end 2015. Retained earnings contributed to capital growth, which increased year over year by 4.6 percent.

In response to environmental challenges, some banks across the nation and in the Fifth District chose alternative strategies to boost earnings and growth by adding more risk to the balance sheet and/or engaging in merger and acquisition activity. As of fourth quarter 2015, Fifth District banks grew both organically and through mergers and acquisitions at a median asset growth pace of 4.5 percent. This asset growth consisted mainly of loan growth. Median loan growth in the Fifth District and the nation stood at 5.9 percent and 6.3 percent, respectively. In the District, the commercial and industrial (9.6 percent) and construction and development (8.8 percent) loan segments had the highest median year-over-year growth rates. The District's largest balance sheet concentration, in terms of capital, remained in commercial real estate.

In conjunction with growing loan portfolios, credit quality also improved. Fifth District credit quality indicators improved with banks' median ratio of nonperforming loans as a percentage of total loans at 1.0 percent, declining to their lowest level since 2008, with improvements centered in the real estate sector. Improvements in credit quality allowed provision levels to fall to their lowest in over a decade, with 15 percent of Fifth District banks reporting negative provisions, providing a boost to earnings.

Conclusion

Overall, economic activity in the District strengthened in 2015. Labor markets continued to tighten, retail and non-retail services firms indicated improved activity, and residential and commercial real estate activity—including construction—expanded. As was the case across much of the country, the strongest headwind came in the form of slowing global demand that most notably impacted the manufacturing and transportation sectors. Low energy prices were also a challenge for certain firms in manufacturing and transportation; in the Fifth District, the slowdown in energy-related activity manifested itself primarily through softening economic indicators for West Virginia.

Economic (nonbanking) data accurate as of March 14, 2016.

Boards, Councils, Officers, and Senior Professionals

FEDERAL RESERVE BANK OF RICHMOND BOARD OF DIRECTORS

The Bank's board of directors oversees management of the Bank and its Fifth District offices, provides timely business and economic information, participates in the formulation of national monetary and credit policies, and serves as a link between the Federal Reserve System and the private sector. Six directors are elected by banks in the Fifth District that are members of the Federal Reserve System, and three are appointed by the Board of Governors. Directors who are not bankers appoint the Bank's president and first vice president with approval from the Board of Governors.

The Bank's board of directors annually appoints the Fifth District's representative to the Federal Advisory Council, which consists of one member from each of the 12 Federal Reserve Districts. The council meets four times a year with the Board of Governors to consult on business conditions and issues related to the banking industry.

BALTIMORE AND CHARLOTTE BRANCHES BOARDS OF DIRECTORS

The Bank's Baltimore and Charlotte branches have separate boards that oversee operations at their respective locations and, like the Richmond Board, contribute to policymaking and provide timely business and economic information about the District. Four directors on each of these boards are appointed by the Richmond directors, and three are appointed by the Board of Governors.

COMMUNITY DEPOSITORY INSTITUTIONS ADVISORY COUNCIL

Created in 2011, the Bank's Community Depository Institutions Advisory Council advises the Bank's management and the Board of Governors on the economy, lending conditions, and other issues from the perspective of banks, thrifts, and credit unions with total assets under $10 billion. The council's members are appointed by the Bank's president.

COMMUNITY INVESTMENT COUNCIL

Established in 2011, the Community Investment Council advises the Bank's management about emerging issues and trends in communities across the Fifth District, including low- and moderate-income neighborhoods in urban and rural areas. The council's members are appointed by the Bank's president.

PAYMENTS ADVISORY COUNCIL

Created in 1978, the Payments Advisory Council serves as a forum for communication with financial institutions about financial services provided by the Federal Reserve. The council helps the Bank respond to the evolving needs of its banking constituency. Council members are appointed by the Bank's first vice president.

Listings of boards and councils include members and titles as of December 31, 2015, unless otherwise noted.

THANK YOU

Thank you to those directors who have completed their service: Wilbur E. Johnson and Brad E. Schwartz of the Richmond Board; Anita G. Newcomb and Stephen R. Sleigh of the Baltimore Board; and Robert R. Hill, Jr., and Lucia Z. Griffith of the Charlotte Board.

The Bank also welcomes five new directors: Catherine A. Meloy and Susan K. Still have joined the Richmond Board; Kenneth R. Banks and Laura L. Gamble have joined the Baltimore Board; and Deborah Aguiar-Vélez has joined the Charlotte Board.

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First row, from the left: C. Richard Miller, Charles R. Patton, Margaret G. Lewis
Second row: Kathy J. Warden, Russell C. Lindner, Robert R. Hill, Jr., Brad E. Schwartz, Thomas C. Nelson, Wilbur E. Johnson

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and Monarch Bank
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Second row: Christopher J. Estes, Samuel L. Ross, Anita G. Newcomb, Susan J. Ganz
Not pictured: Stephen R. Sleigh

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Baltimore, Maryland

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Not pictured: Michael C. Crapps

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Lucia Z. Griffith
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Asheville, North Carolina

Mark L. Williamson
President and Chief Executive Officer
High Point Bank and Trust
High Point, North Carolina

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State Department Federal Credit Union
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Hamilton Bancorp, Inc.
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and ASB Bancorp, Inc.
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American National Bankshares, Inc.
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R. Arthur Seaver
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Michael Walker
President and Chief Executive Officer
Benchmark Community Bank
Kenbridge, Virginia

Frank W. Wilkinson
President and Chief Executive Officer
First Century Bank
Bluefield, West Virginia

** In 2015, Jan Roche served as the Fifth District's representative on the Community Depository Institutions Advisory Council at the Federal Reserve's Board of Governors.*

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Senior Program Officer
The Claude Worthington Benedum Foundation
Pittsburgh, Pennsylvania

Tammy Besherse
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Office of Community and Government Local Relations
Duke University Health System
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Global Metal Finishing, Inc.
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John Hamilton
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City First Enterprises
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Charles Martin
Administrative Vice President, Regional Community Reinvestment Officer
M&T Bank
Baltimore, Maryland

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Freedom First Federal Credit Union
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First Peoples Bank
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TD Bank
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Terry Garner
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Orangeburg, South Carolina

Jamin M. Hujik
Executive Vice President
CresCom Bank
Charleston, South Carolina

Scott Jennings
Senior Vice President and Chief Operating Officer
Summit Community Bank
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Senior Vice President and Chief Financial Officer
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State Employees' Credit Union
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David Willis
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Navy Federal Credit Union
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Gayle Youngblood
Assistant Vice President, Product Management
State Employees Credit Union of Maryland
Linthicum, Maryland

Note: The council's membership year runs from June 1 to May 31, but this listing includes all members who served during 2015.

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From the left: Matthew A. Martin, Becky C. Bareford, Jennifer J. Burns, Mark L. Mullinix, Roland Costa, Janice E. Clatterbuck, Michael D. Stough, Jeffrey M. Lacker, Michelle H. Gluck, Kartik B. Athreya, David E. Beck

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Mark L. Mullinix
First Vice President and Chief Operating Officer

Kartik B. Athreya
Executive Vice President and Director of Research

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Senior Vice President, Human Resources and Finance

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Senior Vice President and Charlotte Regional Executive

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Senior Vice President and General Auditor

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Assistant Vice President

Jacqueline R. Draper
Assistant Vice President

Adam M. Drimer
Assistant Vice President

Kimberley D. Fuller
Assistant Vice President

Jeffrey R. Gerlach
Assistant Vice President

Keith R.G. Goodwin
Assistant General Counsel

Jennifer J. Hall
Assistant General Counsel

Ann S. Harrison
Assistant Vice President

James R. Hart
Assistant Vice President

John S. Insley, Jr.
Assistant Vice President

Pinkaj R. Klokkenga
Assistant Vice President

Diane R. Knapp
Assistant Vice President

D. Keith Larkin
Assistant Vice President

Dan C. Lewis
Assistant Vice President

Steve V. Malone
Assistant Vice President

Randal C. Manspile
Assistant Vice President

Page W. Marchetti
Assistant Vice President and Corporate Secretary

Jonathan P. Martin
Assistant Vice President

Laura H. Mayer
Assistant Vice President

Bennie R. Moore
Assistant Vice President

Cheryl R. Moore
Assistant Vice President

Johnnie E. Moore
Assistant Vice President

Dennis H. Ott, Jr.
Assistant Vice President

Christopher J. Palumbo
Assistant Vice President

Patricia A. Perry
Assistant Vice President

Melanie M. Rose
Assistant Vice President

Jason C. Schemmel
Assistant Vice President

Michael J. Seifert
Assistant Vice President

Brent M. Stanton
Assistant Vice President

Markus A. Summers
Assistant Vice President

Alexander T. Swartz
Assistant Vice President

Sandra L. Tormoen
Assistant Vice President

James Trotta
Assistant Vice President

Lauren E. Ware
Assistant Vice President

H. Julie Yoo
Assistant Vice President

BALTIMORE BRANCH

Steven T. Bareford
Assistant Vice President

CHARLOTTE BRANCH

Lisa A. White
Senior Vice President

Terry J. Wright
Group Vice President, Operations

Jeremy B. Caldwell
Vice President

Richard F. Westerkamp, Jr.
Vice President

Joshua R. Daulton
Assistant Vice President

Kelly J. Stewart
Assistant Vice President

Senior Professionals

RESEARCH

Borys M. Grochulski
Senior Economist

Robert L. Hetzel
Senior Economist and Research Advisor

Andreas L. Hornstein
Senior Advisor

Raymond E. Owens, III
Senior Economist and Policy Advisor

Gary Richardson
Federal Reserve System Historian

Pierre-Daniel G. Sarte
Senior Advisor

John R. Walter
Senior Economist and Policy Advisor

Zhu Wang
Senior Economist

Roy H. Webb
Senior Economist and Policy Advisor

SUPERVISION, REGULATION, AND CREDIT

Eliana Balla
Lead Financial Economist

Craig S. Edwards
Large Bank Principal Examiner

D. Keith Maglinger
Large Bank Principal Examiner

Nada Mora
Senior Financial Economist

Hemangini R. Parekh
Large Bank Principal Examiner

Stanley F. Poszywak
Risk and Policy Team Leader

Todd M. Ryan
Risk and Policy Team Leader

Steven D. Sanderford
Large Bank Principal Examiner

Phillip C. Watts
Large Complex Banking Organization Central Point of Contact

Listings include officers, senior professionals, and titles as of December 31, 2015.

Federal Reserve Information Technology (FRIT) Management Council

From the left: Christopher A. Tignor, Kathryn K. Smith, Matthew D. Larson, Robert I. Turner, Scott C. Furman, Lyn McDermid, David N. Alfano, Paul M. Maguire

Lyn McDermid
System Chief Information Officer

David N. Alfano
Senior Vice President and Chief Administrative Officer

Scott C. Furman
Senior Vice President, Treasury Services

Matthew D. Larson
Senior Vice President, End User Services

Paul M. Maguire
Senior Vice President and Chief Technology Officer

Kathryn K. Smith
Senior Vice President and PMO Director

Christopher A. Tignor
Senior Vice President and Interim Chief Information Security Officer

Robert I. Turner
Senior Vice President and Chief Operating Officer

Federal Reserve Information Technology (FRIT) Officers

Jessie A. Bowen
Senior Vice President

Jeffrey F. Crow
Senior Vice President

Donovan O. Harper, II
Senior Vice President

Andy T. Hendrickson
Senior Vice President

Gerald L. Moreno
Senior Vice President

Brian K. Murray
Senior Vice President

Nicole E. Bennett
Vice President

Jane Y. Burk
Vice President

Gerry P. Collins
Vice President

Michael E. Cortese
Vice President

Kevin J. Craig
Vice President

Albert M. D'Avanzo
Vice President

Fay T. Donahue
Vice President

Frank J. Doto
Vice President

Valerie A. Freund
Vice President

Mark A. Hamilton
Vice President

Kristopher K. Hogan
Vice President

Christine M. Holzem
Vice President

Tamera S. Hornsby-Fink
Vice President

Frederick B. Johnson
Vice President

Carie L. Kelleher
Vice President

S. Craig Minyard
Vice President

Mahnaz Moosa
Vice President

A. Vinton Myers, III
Vice President

Gary M. Patton
Vice President

R. Nathan Ragan
Vice President

Victoria F. Riendeau
Vice President

Joyce M. Romito
Vice President

Joshua N. Snell
Vice President

Sherri L. Thorne
Vice President

Jeannie L. Willette
Vice President

Abigail T. Baker
Assistant Vice President

Michael L. Bellanti
Assistant Vice President

Cynthia S. Bullington
Assistant Vice President

Melissa E. Butler
Assistant Vice President

Reginal L. Bryant
Assistant Vice President

James A. Caulfield
Assistant Vice President

William C. Conway, II
Assistant Vice President

John F. Crabtree
Assistant Vice President

Michael S. Everett
Assistant Vice President

William H. Fenerty
Assistant Vice President

Lisa H. Gravely
Assistant Vice President

Gary A. Helfrich
Assistant Vice President

M. Polly Helm
Assistant Vice President

Peter B. Holleran
Assistant Vice President

M. Brannon Howle
Assistant Vice President

Bradley M. Joiner
Assistant Vice President

John T. Lines
Assistant Vice President

Keith A. Malatesta
Assistant Vice President

Garland H. McKenzie
Assistant Vice President

Ellen D. Mitchell
Assistant Vice President

James O'Connell
Assistant Vice President

Arthur J. Papa
Assistant Vice President

Heidi R. Patterson
Assistant Vice President

Irina V. Piven
Assistant Vice President

Kevin A. Reed
Assistant Vice President

Douglas R. Sampson
Assistant Vice President

Stephanie T. Shetterly
Assistant Vice President

Hunter R. Shomo
Assistant Vice President

Christopher T. Szymonik
Assistant Vice President

Thomas J. Weber
Assistant Vice President

Senior Professionals

Elise P. Ott
Chief Application Integration Engineer

Michael T. Shaughnessy
Chief Application Integration Engineer

Ian W. Beirnes
Treasury Services Architect

Jeffery S. Borneman
Business Architect

Pedro E. Fong
Business Architect

Devin D. Gordon
Business Architect

M. Scott Hannah
Business Architect

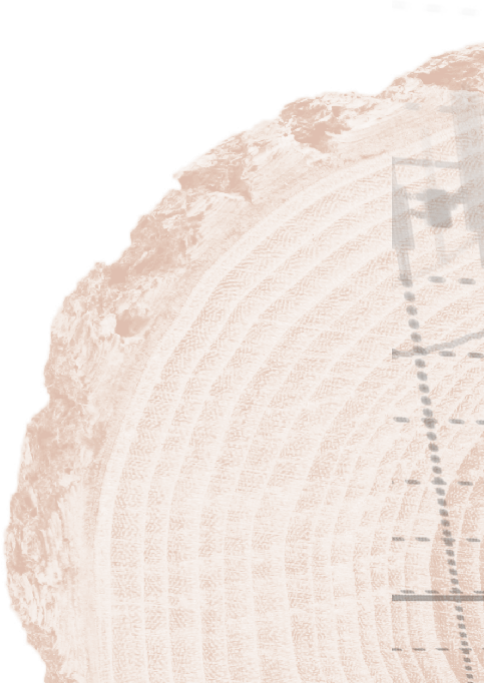
Robert B. Klank
Business Architect

Darren L. Knutson
Business Architect

Donald H. Larmee
Business Architect

Poorav K. Shah
Business Architect

Listings include officers, senior professionals, and titles as of December 31, 2015.



Financial Statements

Statement of Auditor Independence

The Federal Reserve Board engaged KPMG to audit the 2015 combined and individual financial statements of the Reserve Banks and Maiden Lane LLC.[1]

In 2015, KPMG also conducted audits of internal controls over financial reporting for each of the Reserve Banks. Fees for KPMG services totaled $6.7 million, of which $0.4 million was for the audit of Maiden Lane LLC. To ensure auditor independence, the Board requires that KPMG be independent in all matters relating to the audits. Specifically, KPMG 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 2015, the Bank did not engage KPMG for any non-audit services.

[1] In addition, KPMG audited the Office of Employee Benefits of the Federal Reserve System (OEB), the Retirement Plan for Employees of the Federal Reserve System (System Plan), and the Thrift Plan for Employees of the Federal Reserve System (Thrift Plan). The System Plan and the Thrift Plan provide retirement benefits to employees of the Board, the Federal Reserve Banks, the OEB, and the Consumer Financial Protection Bureau.

Management's Report

Management's Report on Internal Control Over Financial Reporting March 8, 2016

To the Board of Directors:

The management of the Federal Reserve Bank of Richmond (Bank) is responsible for the preparation and fair presentation of the Statements of Condition as of December 31, 2015 and 2014, and the Statements of Income and Comprehensive Income, and Statements of Changes in Capital for the years then ended (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 as set forth in the *Financial Accounting Manual for Federal Reserve Banks* (FAM), and, as such, include some amounts that are based on management judgments and estimates. 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 FAM and include all disclosures necessary for such fair presentation.

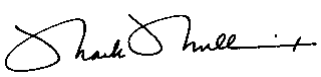
The management of the Bank is responsible for establishing and maintaining effective internal control over financial reporting as it relates to the financial statements. The Bank's internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external reporting purposes in accordance with the FAM. The Bank's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of the Bank's assets; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with FAM, and that the Bank's receipts and expenditures are being made only in accordance with authorizations of its management and directors; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the Bank's assets that could have a material effect on its financial statements.

Even effective internal control, 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. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

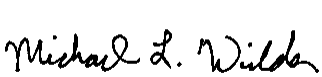
The management of the Bank assessed its internal control over financial reporting based upon the criteria established in the *Internal Control — Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on this assessment, we believe that the Bank maintained effective internal control over financial reporting.

Federal Reserve Bank of Richmond

Jeffrey M. Lacker
President



Mark L. Mullinix
First Vice President and
Chief Operating Officer



Michael L. Wilder
Group Vice President and
Chief Financial Officer

Independent Auditors' Report

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 statement of condition of the Federal Reserve Bank of Richmond ("FRB Richmond") as of December 31, 2015, and the related statements of income and comprehensive income and changes in capital for the year then ended. We also have audited the FRB Richmond's internal control over financial reporting as of December 31, 2015, based on criteria established in *Internal Control — Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. The FRB Richmond's management is responsible for these financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on these financial statements and an opinion on the FRB Richmond's internal control over financial reporting based on our audit. The accompanying financial statements of the FRB Richmond as of December 31, 2014, and for the year then ended were audited by other auditors whose report thereon dated March 11, 2015, expressed an unmodified opinion on those financial statements and contained an emphasis of matter paragraph that described the FRB Richmond's basis of accounting discussed in Note 3 to the 2014 financial statements.

We conducted our audit of the financial statements in accordance with the auditing standards of the Public Company Accounting Oversight Board (United States) ("PCAOB") and in accordance with auditing standards generally accepted in the United States of America. We conducted our audit of internal control over financial reporting in accordance with the auditing standards of the PCAOB and in accordance with attestation standards established by the American Institute of Certified Public Accountants. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement and whether effective internal control over financial reporting was maintained in all material respects. Our audit of the financial statements included examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

The FRB Richmond's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with the accounting principles established by the Board of Governors of the Federal Reserve System (the "Board") as described in Note 3 of the financial statements and as set forth in the *Financial Accounting Manual for Federal Reserve Banks* ("FAM"). The FRB Richmond's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the

FRB Richmond; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with the FAM, and that receipts and expenditures of the FRB Richmond are being made only in accordance with authorizations of management and directors of the FRB Richmond; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the FRB Richmond's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

As described in Note 3 to the financial statements, the FRB Richmond has prepared these financial statements in conformity with the accounting principles established by the Board, as set forth in the FAM, which is a basis of accounting other than U.S. generally accepted accounting principles.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the FRB Richmond as of December 31, 2015, and the results of its operations for the year then ended, on the basis of accounting described in Note 3. Also, in our opinion, the FRB Richmond maintained, in all material respects, effective internal control over financial reporting as of December 31, 2015, based on criteria established in *Internal Control — Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

KPMG LLP

KPMG LLP
Richmond, VA
March 8, 2016

Statements of Condition

(in millions)

As of December 31,		2015	2014
Assets			
Gold certificates		$ 783	$ 824
Special drawing rights certificates		412	412
Coin		301	307
Loans	*Note 4*	—	1
System Open Market Account:	*Note 5*		
Treasury securities, net (of which $1,030 and $623 is lent as of December 31, 2015 and 2014, respectively)		140,166	145,106
Government-sponsored enterprise debt securities, net (of which $8 and $35 is lent as of December 31, 2015 and 2014, respectively)		1,833	2,235
Federal agency and government-sponsored enterprise mortgage-backed securities, net		97,789	99,993
Foreign currency denominated investments, net		4,490	4,358
Central bank liquidity swaps		229	319
Accrued interest receivable		1,392	1,446
Other assets		1	2
Bank premises and equipment, net	*Note 6*	342	349
Interdistrict settlement account		29,869	—
Other assets		115	115
Total assets		**$ 277,722**	**$ 255,467**
Liabilities and Capital			
Federal Reserve notes outstanding, net		$ 95,659	$ 91,935
System Open Market Account:	*Note 5*		
Securities sold under agreements to repurchase		38,693	28,495
Other liabilities		28	46
Deposits:			
Depository institutions		133,840	118,097
Other deposits		140	100
Interest payable to depository institutions		16	6
Accrued benefit costs	*Notes 8 and 9*	303	308
Accrued remittances to the Treasury		183	28
Interdistrict settlement account		—	3,289
Other liabilities		48	49
Total liabilities		**268,910**	**242,353**
Capital paid-in		6,582	6,557
Surplus (including accumulated other comprehensive loss of $29 and $52 at December 31, 2015 and 2014, respectively)		2,230	6,557
Total capital		**8,812**	**13,114**
Total liabilities and capital		**$ 277,722**	**$ 255,467**

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

Statements of Income and Comprehensive Income

(in millions)

For the years ended December 31,		2015	2014
Interest income			
System Open Market Account:	*Note 5*		
Treasury securities, net		$ 3,465	$ 3,622
Government-sponsored enterprise debt securities, net		73	92
Federal agency and government-sponsored enterprise mortgage-backed securities, net		2,681	2,950
Foreign currency denominated investments, net		7	16
Total interest income		**6,226**	**6,680**
Interest expense			
System Open Market Account:	*Note 5*		
Securities sold under agreements to repurchase		13	7
Deposits:			
Depository institutions		401	297
Term Deposit Facility		1	1
Total interest expense		**415**	**305**
Net interest income		**5,811**	**6,375**
Non-interest loss			
System Open Market Account:	*Note 5*		
Federal agency and government-sponsored enterprise mortgage-backed securities gains, net		2	5
Foreign currency translation losses, net		(303)	(606)
Other		1	1
Compensation received for service costs provided		17	15
Reimbursable services to government agencies		42	50
Other		4	3
Total non-interest loss		**(237)**	**(532)**
Operating expenses			
Salaries and benefits		434	422
Occupancy		50	50
Equipment		78	73
Other		(196)	(181)
Assessments:			
Board of Governors operating expenses and currency costs		225	187
Bureau of Consumer Financial Protection		111	116
Total operating expenses		**702**	**667**
Net income before providing for remittances to the Treasury		4,872	5,176
Earnings remittances to the Treasury:	*Note 12*		
Interest on Federal Reserve notes		4,112	3,974
Required by the Federal Reserve Act, as amended by the FAST Act	*Note 3n*	4,715	—
Total earnings remittances to the Treasury		**8,827**	**3,974**
Net (loss) income after providing for remittances to the Treasury		**(3,955)**	**1,202**
Change in prior service costs related to benefit plans	*Note 9*	(3)	(4)
Change in actuarial losses related to benefit plans	*Note 9*	26	(22)
Total other comprehensive income (loss)		**23**	**(26)**
Comprehensive (loss) income		**$ (3,932)**	**$ 1,176**

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

Statements of Changes in Capital

(in millions, except share data)

For the years ended December 31, 2015, and December 31, 2014	Capital paid-in	Surplus			Total capital
		Net income retained	Accumulated other comprehensive income (loss)	Total surplus	
Balance at December 31, 2013 (114,722,758 shares)	$ 5,736	$ 5,762	$ (26)	$ 5,736	$ 11,472
Net change in capital stock issued (16,418,000 shares)	821	—	—	—	821
Comprehensive income:					
Net income	—	1,202	—	1,202	1,202
Other comprehensive loss	—	—	(26)	(26)	(26)
Dividends on capital stock	—	(355)	—	(355)	(355)
Net change in capital	**821**	**847**	**(26)**	**821**	**1,642**
Balance at December 31, 2014 (131,140,758 shares)	$ 6,557	$ 6,609	$ (52)	$ 6,557	$ 13,114
Net change in capital stock issued (494,935 shares)	25	—	—	—	25
Comprehensive income:					
Net loss	—	(3,955)	—	(3,955)	(3,955)
Other comprehensive income	—	—	23	23	23
Dividends on capital stock	—	(395)	—	(395)	(395)
Net change in capital	**25**	**(4,350)**	**23**	**(4,327)**	**(4,302)**
Balance at December 31, 2015 (131,635,693 shares)	**$ 6,582**	**$ 2,259**	**$ (29)**	**$ 2,230**	**$ 8,812**

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) and is one of the 12 Federal Reserve Banks (Reserve Banks) created by Congress under the Federal Reserve Act of 1913 (Federal Reserve Act), which established the central bank of the United States. The Reserve Banks are chartered by the federal government and possess a unique set of governmental, corporate, and central bank characteristics. The Bank serves the Fifth Federal Reserve District, which includes Maryland, North Carolina, South Carolina, Virginia, District of Columbia, and portions of West Virginia.

In accordance with the Federal Reserve Act, supervision and control of the Bank is 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 of the Federal Reserve System (Board of Governors) to represent the public, and six directors are elected by member banks. Banks that are members of the System include all nationally-chartered banks and any state-chartered banks that apply and are approved for membership. 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.

In addition to the 12 Reserve Banks, the System also consists, in part, of the Board of Governors and the Federal Open Market Committee (FOMC). The Board of Governors, an independent federal agency, is charged by the Federal Reserve Act with a number of specific duties, including general supervision over the Reserve Banks. 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.

2 OPERATIONS AND SERVICES

The Reserve Banks perform a variety of services and operations. These functions include participating in formulating and conducting monetary policy; participating in the payment system, including transfers of funds, automated clearinghouse (ACH) operations, and check collection; distributing coin and currency; performing fiscal agency functions for the U.S. Department of the Treasury (Treasury), certain federal agencies, and other entities; serving as the federal government's bank; providing short-term loans to depository institutions; providing loans to participants in programs or facilities with broad-based eligibility in unusual and exigent circumstances; serving consumers and communities by providing educational materials and information regarding financial consumer protection rights and laws and information on community development programs and activities; and supervising bank holding companies, state member banks, savings and loan holding companies, U.S. offices of foreign banking organizations, and designated financial market utilities pursuant to authority delegated by the Board of Governors. Certain services are provided to foreign and international monetary authorities, primarily by the FRBNY.

The FOMC, in conducting monetary policy, establishes policy regarding domestic open market operations, oversees these operations, and issues authorizations and directives to the FRBNY to execute transactions. The FOMC authorizes and directs the FRBNY to conduct operations in domestic markets, including the direct purchase and sale of Treasury securities, government-sponsored enterprise (GSE) debt securities, and federal agency and GSE mortgage-backed securities (MBS); the purchase of these securities under agreements to resell; and the sale of these securities under agreements to repurchase. The FRBNY holds the resulting securities and agreements in a portfolio known as the System Open Market Account (SOMA). The FRBNY is authorized and directed to lend the Treasury securities and GSE debt securities that are held in the SOMA.

To be prepared to counter disorderly conditions in foreign exchange markets or to meet other needs specified by the FOMC to carry out the System's central bank responsibilities, the FOMC has authorized and directed the FRBNY to

execute spot and forward foreign exchange transactions in 14 foreign currencies, to hold balances in those currencies, and to invest such foreign currency holdings, while maintaining adequate liquidity. The FRBNY holds these securities and obligations in the SOMA. The FOMC has also authorized the FRBNY to maintain reciprocal currency arrangements with the Bank of Canada and the Bank of Mexico in the maximum amounts of $2 billion and $3 billion, respectively, and to warehouse foreign currencies for the Treasury and the Exchange Stabilization Fund in the maximum amount of $5 billion.

Because of the global character of bank funding markets, the System has at times coordinated with other central banks to provide liquidity. The FOMC authorized and directed the FRBNY to establish U.S. dollar liquidity and reciprocal foreign currency liquidity swap lines with the Bank of Canada, the Bank of England, the European Central Bank, the Bank of Japan, and the Swiss National Bank. The FRBNY holds amounts outstanding under these swap lines in the SOMA. These swap lines, which were originally established as temporary arrangements, were converted to standing arrangements on October 31, 2013, and will remain in place until further notice.

Although the Reserve Banks are separate legal entities, they collaborate on the delivery of certain services to achieve greater efficiency and effectiveness. This collaboration takes the form of centralized operations and product or function offices that have responsibility for the delivery of certain services on behalf of the Reserve Banks. Various operational and management models are used and are supported by service agreements between the Reserve Banks. In some cases, costs incurred by a Reserve Bank for services provided to other Reserve Banks are not shared; in other cases, the Reserve Banks are reimbursed for costs incurred in providing services to other Reserve Banks. Major services provided by the Bank on behalf of the System for which the costs were not reimbursed by the other Reserve Banks include Standard Cash Automation, Currency Technology Office, the Payroll Central Business Administration Function, Daylight Overdraft Reporting and Pricing, and the National Procurement Office. Costs are, however, redistributed to the other Reserve Banks for computing and support services the Bank provides for the System. The Bank's total reimbursement for these services was $367 million and $348 million for the years ended December 31, 2015 and 2014, respectively, and is included in "Operating expenses: Other" on the Statements of Income and Comprehensive Income.

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 accounting standard-setting bodies. The Board of Governors has developed specialized accounting principles and practices that it considers to be appropriate for the nature and function of a central bank. These accounting principles and practices are documented in the *Financial Accounting Manual for Federal Reserve Banks* (FAM), which is issued by the Board of Governors. The Reserve Banks are required to adopt and apply accounting policies and practices that are consistent with the FAM. The financial statements and associated disclosures have been prepared in accordance with the FAM.

Limited differences exist between the accounting principles and practices in the FAM and accounting principles generally accepted in the United States of America (GAAP), due to the unique nature of the Bank's powers and responsibilities as part of the nation's central bank and given the System's unique responsibility to conduct monetary policy. The primary differences are the presentation of all SOMA securities holdings at amortized cost, adjusted for credit impairment, if any, the recording of all SOMA securities on a settlement-date basis, and the use of straight-line amortization for Treasury securities, GSE debt securities, and foreign currency denominated investments. Amortized cost, rather than the fair value presentation, more appropriately reflects the financial position associated with the Bank's securities holdings given the System's unique responsibility to conduct monetary policy. Although the application of fair value measurements to the securities holdings may result in values substantially greater or less than their carrying values, these unrealized changes in value have no direct effect on the quantity of reserves available to the banking system or on the ability of the Reserve Banks, as the central bank, to meet their financial obligations and responsibilities. Both the domestic and foreign components of the SOMA portfolio may involve transactions that result in gains or losses when holdings are sold before maturity. Decisions regarding securities and foreign currency transactions, including their purchase and sale, are motivated by monetary policy objectives rather than profit. Accordingly, fair

values, earnings, and gains or losses resulting from the sale of such securities and currencies are incidental to open market operations and do not motivate decisions related to policy or open market activities. Accounting for these securities on a settlement-date basis, rather than the trade-date basis required by GAAP, better reflects the timing of the transaction's effect on the quantity of reserves in the banking system. The cost bases of Treasury securities, GSE debt securities, and foreign government debt instruments are adjusted for amortization of premiums or accretion of discounts on a straight-line basis, rather than using the interest method required by GAAP.

In addition, the Bank does not present a Statement of Cash Flows as required by GAAP because the liquidity and cash position of the Bank are not a primary concern given the Reserve Bank's unique powers and responsibilities as a central bank. Other information regarding the Bank's activities is provided in, or may be derived from, the Statements of Condition, Income and Comprehensive Income, and Changes in Capital, and the accompanying notes to the financial statements. Other than those described above, there are no significant differences between the policies outlined in the FAM and GAAP.

Preparing the financial statements in conformity with the FAM requires management to make certain estimates and assumptions that affect the reported amounts of assets and liabilities, the 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.

Significant accounts and accounting policies are explained below.

a. Consolidation

The Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd-Frank Act) established the Bureau of Consumer Financial Protection (Bureau) as an independent bureau within the System that has supervisory authority over some institutions previously supervised by the Reserve Banks in connection with those institutions' compliance with consumer protection statutes. Section 1017 of the Dodd-Frank Act provides that the financial statements of the Bureau are not to be consolidated with those of the Board of Governors or the System. The Board of Governors funds the Bureau through assessments on the Reserve Banks as required by the Dodd-Frank Act. The Reserve Banks reviewed the law and evaluated the design of and their relationship to the Bureau and determined that it should not be consolidated in the Bank's financial statements.

b. Gold and Special Drawing Rights Certificates

The Secretary of the Treasury is authorized to issue gold certificates to the Reserve Banks. Upon authorization, the Reserve Banks acquire gold certificates by crediting equivalent amounts in dollars to the account established for the Treasury. The gold certificates held by the Reserve Banks are required to be backed by the gold owned by the Treasury. The Treasury may reacquire the gold certificates at any time, and the Reserve Banks must deliver them to the Treasury. At such time, the Treasury's account is charged, and the Reserve Banks' gold certificate accounts are reduced. The value of gold for purposes of backing the gold certificates is set by law at $42 2/9 per fine troy ounce. Gold certificates are recorded by the Banks at original cost. The Board of Governors allocates the gold certificates among the Reserve Banks once a year based on each Reserve Bank's average Federal Reserve notes outstanding during the preceding 12 months.

Special drawing rights (SDR) are issued by the International Monetary Fund (IMF) to its members in proportion to each member's quota in the IMF 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 U.S. participation in the SDR system, the Secretary of the Treasury is authorized to issue SDR certificates to the Reserve Banks. When SDR certificates are issued to the Reserve Banks, equivalent amounts in U.S. dollars are credited to the account established for the Treasury and the Reserve Banks' SDR certificate accounts are increased. The Reserve Banks are required to purchase SDR certificates, at the direction of the Treasury, for the purpose of financing SDR acquisitions or for financing exchange-stabilization operations. At the time SDR certificate transactions occur, the Board of Governors allocates the SDR certificates among the Reserve Banks based upon each Reserve Bank's Federal Reserve notes outstanding at the end of the preceding calendar year. SDR certificates are recorded by the Banks at original cost.

c. Coin

The amount reported as coin in the Statements of Condition represents the face value of all United States coin held by the Bank. The Bank buys coin at face value from the U.S. Mint in order to fill depository institution orders.

d. Loans

Loans to depository institutions are reported at their outstanding principal balances and interest income is recognized on an accrual basis.

Loans are impaired when current information and events indicate that it is probable that the Bank will not receive the principal and interest that are due in accordance with the contractual terms of the loan agreement. Impaired loans are evaluated to determine whether an allowance for loan loss is required. The Bank has developed procedures for assessing the adequacy of any allowance for loan losses using all available information to identify incurred losses. This assessment includes monitoring information obtained from banking supervisors, borrowers, and other sources to assess the credit condition of the borrowers and, as appropriate, evaluating collateral values. Generally, the Bank would discontinue recognizing interest income on impaired loans until the borrower's repayment performance demonstrates principal and interest would be received in accordance with the terms of the loan agreement. If the Bank discontinues recording interest on an impaired loan, cash payments are first applied to principal until the loan balance is reduced to zero; subsequent payments are applied as recoveries of amounts previously deemed uncollectible, if any, and then as interest income.

e. Securities Purchased Under Agreements to Resell, Securities Sold Under Agreements to Repurchase, and Securities Lending

The FRBNY may engage in purchases of securities with primary dealers under agreements to resell (repurchase transactions). These repurchase transactions are typically settled through a tri-party arrangement. In the United States, there are two commercial custodial banks that provide these services. In a tri-party arrangement, a commercial custodial bank manages the collateral clearing, settlement, pricing, and pledging, and provides cash and securities custodial services for and on behalf of the FRBNY and counterparty. The collateral pledged must exceed the principal amount of the transaction by a margin determined by the FRBNY for each class and maturity of acceptable collateral. Collateral designated by the FRBNY as acceptable under repurchase transactions primarily includes Treasury securities (including Treasury Inflation-Protected Securities, Separate Trading of Registered Interest and Principal of Securities Treasury securities, and Treasury Floating Rate Notes); direct obligations of several federal and GSE-related agencies, including Federal National Mortgage Association, Federal Home Loan Mortgage Corporation, and Federal Home Loan Banks; and pass-through federal agency and GSE MBS. The repurchase transactions are accounted for as financing transactions with the associated interest income recognized over the life of the transaction. These transactions are reported at their contractual amounts as "System Open Market Account: Securities purchased under agreements to resell" and the related accrued interest receivable is reported as a component of "System Open Market Account: Accrued interest receivable" in the Statements of Condition.

The FRBNY may engage in sales of securities under agreements to repurchase with primary dealers and with a set of expanded counterparties that includes banks, savings associations, GSEs, and domestic money market funds (Primary dealer and expanded counterparties reverse repurchase agreements). These reverse repurchase transactions are designed to have a margin of zero and are settled through a tri-party arrangement, similar to repurchase transactions. Reverse repurchase transactions may also be executed with foreign official and international account holders as part of a service offering. Reverse repurchase agreements are collateralized by a pledge of an amount of Treasury securities, GSE debt securities, or federal agency and GSE MBS that are held in the SOMA. Reverse repurchase transactions are accounted for as financing transactions, and the associated interest expense is recognized over the life of the transaction. These transactions are reported at their contractual amounts as "System Open Market Account: Securities sold under agreements to repurchase" and the related accrued interest payable is reported as a component of "System Open Market Account: Other liabilities" in the Statements of Condition.

Treasury securities and GSE debt securities held in the SOMA may be lent to primary dealers, typically overnight, to facilitate the effective functioning of the domestic securities markets. The amortized cost basis of securities lent continues to be reported as "System Open Market Account: Treasury securities, net" and "System Open Market Account: Government-sponsored enterprise debt securities, net," as appropriate, in the Statements of Condition. Securities lending transactions are fully collateralized by Treasury securities based on the fair values of the securities lent increased by a margin determined by the FRBNY. The FRBNY charges the primary dealer a fee for borrowing securities, and these fees are reported as a component of "Non-interest loss: System Open Market Account: Other" in the Statements of Income and Comprehensive Income.

Activity related to securities purchased under agreements to resell, securities sold under agreements to repurchase, and securities lending is allocated to each of the Reserve Banks on a percentage basis derived from an annual settlement of the interdistrict settlement account that occurs in the second quarter of each year.

f. Treasury Securities, Government-Sponsored Enterprise Debt Securities, Federal Agency and Government-Sponsored Enterprise Mortgage-Backed Securities, and Foreign Currency Denominated Investments

Interest income on Treasury securities, GSE debt securities, and foreign currency denominated investments included in the SOMA is accrued using the straight-line method. Interest income on federal agency and GSE MBS is accrued using the interest method and includes amortization of premiums, accretion of discounts, and gains or losses associated with principal paydowns. Premiums and discounts related to federal agency and GSE MBS are amortized or accreted over the term of the security to stated maturity, and the amortization of premiums and accretion of discounts are accelerated when principal payments are received. Gains and losses resulting from sales of securities are determined by specific issue based on average cost. Treasury securities, GSE debt securities, and federal agency and GSE MBS are reported net of premiums and discounts in the Statements of Condition and interest income on those securities is reported net of the amortization of premiums and accretion of discounts in the Statements of Income and Comprehensive Income.

In addition to outright purchases of federal agency and GSE MBS that are held in the SOMA, the FRBNY enters into dollar roll transactions (dollar rolls), which primarily involve an initial transaction to purchase or sell "to be announced" (TBA) MBS for delivery in the current month combined with a simultaneous agreement to sell or purchase TBA MBS on a specified future date. During the years ended December 31, 2015 and 2014, the FRBNY executed dollar rolls to facilitate settlement of outstanding purchases of federal agency and GSE MBS. The FRBNY accounts for dollar rolls as individual purchases and sales, on a settlement-date basis. Accounting for these transactions as purchases and sales, rather than as financing transactions, is appropriate because the purchase or sale component of the MBS TBA dollar roll is paired off or assigned prior to settlement and, as a result, there is no transfer and return of securities. The FRBNY also conducts small-value exercises from time to time for the purpose of testing operational readiness. Small-value exercises may include sales of federal agency and GSE MBS. Net gains resulting from MBS transactions are reported as a component of "Non-interest income: System Open Market Account: Federal agency and government-sponsored enterprise mortgage-backed securities gains, net" in the Statements of Income and Comprehensive Income.

Foreign currency denominated investments, which can include foreign currency deposits, securities purchased under agreements to resell, and government debt instruments, are revalued daily at current foreign currency market exchange rates in order to report these assets in U.S. dollars. Foreign currency translation gains and losses that result from the daily revaluation of foreign currency denominated investments are reported as "Non-interest loss: System Open Market Account: Foreign currency translation losses, net" in the Statements of Income and Comprehensive Income.

Because the FRBNY enters into commitments to buy Treasury securities, federal agency and GSE MBS, and foreign government debt instruments and records the related securities on a settlement-date basis in accordance with the FAM, the related outstanding commitments are not reflected in the Statements of Condition.

Activity related to Treasury securities, GSE debt securities, and federal agency and GSE MBS, including the premiums, discounts, and realized gains and losses, is allocated to each Reserve Bank on a percentage basis derived from an annual settlement of the interdistrict settlement account that occurs in the second quarter of each year. Activity related to foreign currency denominated investments, including the premiums, discounts, and realized and unrealized gains and losses, is allocated in the first quarter of each year to each Reserve Bank based on the ratio of each Reserve Bank's capital and surplus to the Reserve Banks' aggregate capital and surplus at the preceding December 31.

g. Central Bank Liquidity Swaps

Central bank liquidity swaps, which are transacted between the FRBNY and a foreign central bank, can be structured as either U.S. dollar or foreign currency liquidity swap arrangements.

Central bank liquidity swaps activity, including the related income and expense, is allocated in the first quarter of each year to each Reserve Bank based on the ratio of each Reserve Bank's capital and surplus to the Reserve Banks' aggregate capital and surplus at the preceding December 31. The foreign currency amounts associated with these central bank liquidity swap arrangements are revalued daily at current foreign currency market exchange rates.

U.S. dollar liquidity swaps

At the initiation of each U.S. dollar liquidity swap transaction, the foreign central bank transfers a specified amount of its currency to a restricted account for the FRBNY in exchange for U.S. dollars at the prevailing market exchange rate. Concurrent with this transaction, the FRBNY and the foreign central bank agree to a second transaction that obligates the foreign central bank to return the U.S. dollars and the FRBNY to return the foreign currency on a specified future date at the same exchange rate as the initial transaction. The Bank's allocated portion of the foreign currency amounts that the FRBNY acquires are reported as "System Open Market Account: Central bank liquidity swaps" in the Statements of Condition. Because the swap transaction will be unwound at the same U.S. dollar amount and exchange rate that were used in the initial transaction, the recorded value of the foreign currency amounts is not affected by changes in the market exchange rate.

The foreign central bank compensates the FRBNY based on the amount outstanding and the rate under the swap agreement. The Bank's allocated portion of the amount of compensation received during the term of the swap transaction is reported as "Interest income: System Open Market Account: Central bank liquidity swaps" in the Statements of Income and Comprehensive Income.

Foreign currency liquidity swaps

Foreign currency liquidity swap transactions involve the transfer by the FRBNY, at the prevailing market exchange rate, of a specified amount of U.S. dollars to an account for the foreign central bank in exchange for its currency. The foreign currency amounts that the FRBNY receives are recorded as a liability.

h. 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 the estimated useful lives of the assets, which range from 2 to 50 years. Major alterations, renovations, and improvements are capitalized at cost as additions to the asset accounts and are depreciated over the remaining useful life of the asset or, if appropriate, over the unique useful life of the alteration, renovation, or improvement. Maintenance, repairs, and minor replacements are charged to operating expense in the year incurred. Reserve Banks may transfer assets to other Reserve Banks or may lease property of other Reserve Banks.

Costs incurred to acquire software are capitalized based on the purchase price. Costs incurred during the application development stage to develop internal-use software are capitalized based on the cost of direct services and materials associated with designing, coding, installing, and testing the software. Capitalized software costs are amortized on a straight-line basis over the estimated useful lives of the software applications, which generally range from two to five years. Maintenance costs and minor replacements related to software are charged to operating expense in the year incurred. Leased assets that meet the criteria of ASC 840, *Leases* are capitalized and amortized over the shorter of the useful life of the asset or the term of the lease.

Capitalized assets, including software, buildings, leasehold improvements, furniture, and equipment, are impaired and an adjustment is recorded when events or changes in circumstances indicate that the carrying amount of assets or asset groups is not recoverable and significantly exceeds the assets' fair value.

i. Interdistrict Settlement Account

Each Reserve Bank aggregates the payments due to or from other Reserve Banks. These payments result from transactions between the Reserve Banks and transactions that involve depository institution accounts held by other Reserve Banks, such as Fedwire funds and securities transfers and check and ACH transactions. The cumulative net amount due to or from the other Reserve Banks is reflected in the "Interdistrict settlement account" in the Statements of Condition.

An annual settlement of the interdistrict settlement account occurs in the second quarter of each year. As a result of the annual settlement, the balance in each Bank's interdistrict settlement account is adjusted by an amount equal to the average balance in the account during the previous twelve-month period ended March 31. An equal and offsetting adjustment is made to each Bank's allocated portion of SOMA assets and liabilities.

j. Federal Reserve Notes

Federal Reserve notes are the circulating currency of the United States. These notes, which are identified as issued to a specific Reserve Bank, must be fully collateralized. All of the Bank's assets are eligible to be pledged as collateral. The collateral value is equal to the book value of the collateral tendered with the exception of securities, for which the collateral value is equal to the par value of the securities tendered. The par value of securities sold under agreements to repurchase is deducted from the eligible collateral value.

The Board of Governors may, at any time, call upon a Reserve Bank for additional security to adequately collateralize outstanding 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 issued to 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, Federal Reserve notes are obligations of the United States government.

"Federal Reserve notes outstanding, net" in the Statements of Condition represents the Bank's Federal Reserve notes outstanding, reduced by the Bank's currency holdings of $10,988 million and $11,153 million at December 31, 2015 and 2014, respectively.

At December 31, 2015 and 2014, all Federal Reserve notes outstanding, reduced by the Reserve Bank's currency holdings, were fully collateralized. At December 31, 2015, all gold certificates, all special drawing rights certificates, and $1,363 billion of domestic securities held in the SOMA were pledged as collateral. At December 31, 2015, no investments denominated in foreign currencies were pledged as collateral.

k. Deposits

Depository Institutions

Depository institutions' deposits represent the reserve and service-related balances in the accounts that depository institutions hold at the Bank. Required reserve balances are those that a depository institution must hold to satisfy its reserve requirement. Reserve requirements are the amount of funds that a depository institution must hold in reserve against specified deposit liabilities. Excess reserves are those held by the depository institutions in excess of their required reserve balances. The interest rates paid on required reserve balances and excess balances are determined by the Board of Governors, based on an FOMC-established target range for the federal funds rate. Interest expense on depository institutions' deposits is accrued daily at the appropriate rate. Interest payable is reported as a component of "Interest payable to depository institutions" in the Statements of Condition.

The Term Deposit Facility (TDF) consists of deposits with specific maturities held by eligible institutions at the Reserve Banks. The Reserve Banks pay interest on these deposits at interest rates determined by auction. Interest expense on depository institutions' deposits is accrued daily at the appropriate rate. Interest payable is reported as a component of "Interest payable to depository institutions" in the Statements of Condition. There were no deposits held by the Bank under the TDF at December 31, 2015 and 2014.

Other

Other deposits include the Bank's allocated portion of foreign central bank and foreign government deposits held at the FRBNY.

l. 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. These shares are nonvoting, with a par value of $100, and may not be transferred or hypothecated. As a member bank's capital and surplus changes, its holdings of Reserve Bank stock must be adjusted. Currently, only one-half of the subscription is paid in, and the remainder is subject to call. A member bank is liable for Reserve Bank liabilities up to twice the par value of stock subscribed by it.

By law, each Reserve Bank was required to pay each member bank an annual dividend of 6 percent on the paid-in capital stock. This cumulative dividend is paid semiannually.

The *Fixing America's Surface Transportation Act* (FAST Act), which was enacted on December 4, 2015, amended section 7 of the Federal Reserve Act related to Reserve Bank surplus and the payment of dividends to member banks. The FAST Act changed the dividend rate for member banks with more than $10 billion of consolidated assets, effective January 1, 2016, to the smaller of 6 percent or the rate equal to the high yield of the 10-year Treasury note auctioned at the last auction held prior to the payment of the dividend. The FAST Act did not change the 6 percent dividend rate for member banks with $10 billion or less of total consolidated assets. The provisions of the FAST Act related to dividend payments did not affect the amounts reported by the Bank for the year ended December 31, 2015, but are expected to reduce the amount of dividend payments made to member banks in future years.

m. Surplus

Before the enactment of the FAST Act, the Board of Governors required the Reserve Banks to maintain a surplus equal to the amount of capital paid-in. On a daily basis, surplus was adjusted to equate the balance to capital paid-in. Effective December 4, 2015, the FAST Act limits aggregate Reserve Bank surplus to $10 billion. Reserve Bank surplus is allocated among the Reserve Banks based on the ratio of each Bank's capital paid-in to total Reserve Bank capital paid-in as of December 31 of each year.

Accumulated other comprehensive income is reported as a component of "Surplus" in the Statements of Condition and the Statements of Changes in Capital. Additional information regarding the classifications of accumulated other comprehensive income is provided in Notes 9 and 10.

n. Earnings Remittances to the Treasury

Before the enactment of the FAST Act, the Board of Governors required the Reserve Banks to transfer excess earnings to the Treasury after providing for the costs of operations, payment of dividends, and reservation of an amount necessary to equate surplus with capital paid-in. The Federal Reserve Act, as amended by the FAST Act effective December 4, 2015, now requires that any amounts of the surplus funds of the Reserve Banks that exceed, or would exceed, the aggregate limitation of $10 billion shall be transferred to the Board of Governors for transfer to the Treasury. The Bank remits excess earnings to the Treasury after providing for the cost of operations, payment of dividends, and reservation of an amount necessary to maintain surplus at the Bank's allocated portion of the $10 billion aggregate surplus limitation. Remittances to the Treasury are made on a weekly basis. The amount of the remittances to the Treasury that were required under the Board of Governor's policy is reported as "Earnings remittances to the Treasury: Interest on Federal Reserve notes" in the Statements of Income and Comprehensive Income. The amount of remittances to the Treasury that are required by the FAST Act is reported as "Earnings remittances to the Treasury: Required by the Federal Reserve Act, as amended by the FAST Act" in the Statements of Income and Comprehensive Income. The amount due to the Treasury is reported as "Accrued remittances to the Treasury" in the Statements of Condition. See Note 12 for additional information on earnings remittances to the Treasury.

Under the previous Board of Governor's policy, if earnings during the year were not sufficient to provide for the costs of operations, payment of dividends, and equating surplus and capital paid-in, remittances to the Treasury were suspended, and under the FAST Act, if earnings during the year are not sufficient to provide for the costs of operations, payment of dividends, and maintaining surplus at an amount equal to the Bank's allocated portion of the $10 billion aggregate surplus limitation, remittances to the Treasury are suspended. A deferred asset is recorded that represents the amount of net earnings a Reserve Bank will need to realize before remittances to the Treasury resume. This deferred asset is periodically reviewed for impairment.

o. Income and Costs Related to Treasury Services

When directed by the Secretary of the Treasury, the Bank is required by the Federal Reserve Act to serve as fiscal agent and depositary of the United States Government. By statute, the Treasury has appropriations to pay for these services. During the years ended December 31, 2015 and 2014, the Bank was reimbursed for all services provided to the Treasury as its fiscal agent.

p. Compensation Received for Service Costs Provided

The Federal Reserve Bank of Atlanta has overall responsibility for managing the Reserve Banks' provision of check and ACH services to depository institutions, the FRBNY has overall responsibility for managing the Reserve Banks' provision of Fedwire funds and securities services, and the Federal Reserve Bank of Chicago has overall responsibility for managing the Reserve Banks' provision of electronic access services to depository institutions. The Reserve Bank that has overall responsibility for managing these services recognizes the related total System revenue in its Statements of Income and Comprehensive Income. The Bank is compensated for costs incurred to provide these services by the Reserve Banks responsible for managing these services and reports this compensation as "Non-interest loss: Compensation received for service costs provided" in its Statements of Income and Comprehensive Income.

q. Assessments

The Board of Governors assesses the Reserve Banks to fund its operations and the operations of the Bureau. These assessments are allocated to each Reserve Bank based on each Reserve Bank's capital and surplus balances. The Board of Governors also assesses each Reserve Bank for expenses related to producing, issuing, and retiring Federal Reserve notes based on each Reserve Bank's share of the number of notes comprising the System's net liability for Federal Reserve notes on December 31 of the prior year.

The Dodd-Frank Act requires that, after the transfer of its responsibilities to the Bureau on July 21, 2011, the Board of Governors fund the Bureau in an amount not to exceed a fixed percentage of the total operating expenses of the System as reported in the Board of Governor's 2009 annual report, which totaled $4.98 billion. After 2013, the amount will be adjusted annually in accordance with the provisions of the Dodd-Frank Act. The percentage of total operating expenses of the System for the years ended December 31, 2015 and 2014 was 12.42 percent ($618.7 million) and 12.22 percent ($608.4 million), respectively. The Bank's assessment for Bureau funding is reported as "Assessments: Bureau of Consumer Financial Protection" in the Statements of Income and Comprehensive Income.

r. 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 million and $1 million for the years ended December 31, 2015 and 2014, respectively, and are reported as a component of "Operating expenses: Occupancy" in the Statements of Income and Comprehensive Income.

s. Restructuring Charges

The Reserve Banks recognize restructuring charges for exit or disposal costs incurred as part of the closure of business activities in a particular location, the relocation of business activities from one location to another, or a fundamental reorganization that affects the nature of operations. Restructuring charges may include costs associated with employee separations, contract terminations, and asset impairments. Expenses are recognized in the period in which the Bank commits to a formalized restructuring plan or executes the specific actions contemplated in the plan and all criteria for financial statement recognition have been met.

In 2014, the Treasury announced plans to consolidate the provision of substantially all fiscal agent services for the U.S. Treasury at the Federal Reserve Bank of Cleveland, the Federal Reserve Bank of Kansas City, the FRBNY, and the Federal Reserve Bank of St. Louis. The implementation plan associated with this consolidation is expected to be completed in 2018.

Note 11 describes the Bank's restructuring initiatives and provides information about the costs and liabilities associated with employee separations and contract terminations. Costs and liabilities associated with enhanced pension benefits in connection with the restructuring activities for all of the Reserve Banks are recorded on the books of the FRBNY.

The Bank had no significant restructuring activities in 2015.

t. Recently Issued Accounting Standards

In April 2014, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update (ASU) 2014–08, *Presentation of Financial Statements (Topic 205) and Property, Plant, and Equipment (Topic 360): Reporting Discontinued Operations and Disclosures of Disposals of Components of an Entity*. This update changes the requirements for reporting discontinued operations, which may include a component of an entity or a group of components of an entity, or a business or nonprofit activity. This update is effective for the Bank for the year ended December 31, 2015, and did not have a material effect on the Bank's financial statements.

In May 2014, the FASB issued ASU 2014–09, *Revenue from Contracts with Customers (Topic 606).* This update was issued to create common revenue recognition guidance for U.S. GAAP and International Financial Reporting Standards. The guidance is applicable to all contracts for the transfer of goods or services regardless of industry or type of transaction. This update requires recognition of revenue in a manner that reflects the consideration that the entity expects to receive in return for the transfer of goods or services to customers. In August 2015, the FASB issued ASU 2015–14, *Revenue from Contracts with Customers (Topic 606): Deferral of the Effective Date,* which delayed the required effective date of this accounting by one year. This revenue recognition accounting guidance is effective for the Bank for the year ending December 31, 2019, although the Bank may elect to adopt guidance earlier. The Bank is continuing to evaluate the effect of this new guidance on the Bank's financial statements.

In June 2014, the FASB issued ASU 2014–11, *Transfer and Servicing (Topic 860): Repurchase-to-Maturity Transactions, Repurchase Financings, and Disclosures*. This update requires certain changes in the accounting for repurchase-to-maturity transactions and repurchase financing transactions. Additionally, this update provides guidance for the disclosures for certain transfers of financial assets accounted for as sales, where the transferor retains substantially all of the exposure to economic return on the transferred financial asset; and repurchase agreements, securities lending transactions, and repurchase-to-maturity transactions that are accounted for as secured borrowings. This update is effective for the Bank for the year ended December 31, 2015. The update did not have any effect on the Bank's accounting for these transactions. The relevant required disclosures have been included in the Note 3e and Note 5 to the Bank's financial statements.

In April 2015, the FASB issued ASU 2015–05, *Intangibles - Goodwill and Other - Internal Use Software (Subtopic 350–40).* The amendments in this update provide guidance to customers about whether a cloud computing arrangement includes a software license. If a cloud computing arrangement includes a software license, then the customer should account for the software license element of the arrangement consistent with the acquisition of other software licenses. If a cloud computing arrangement does not include a software license, the customer should account for the arrangement as a service contract. Consequently, all software licenses within the scope of subtopic 350–40 will be accounted for consistent with other licenses of intangible assets. This update is effective for the Bank for the year ending December 31, 2016, and is not expected to have a material effect on the Bank's financial statements.

In July 2015, the FASB issued ASU 2015–12, *Plan Accounting: Defined Benefit Pension Plans (Topic 960), Defined Contribution Pension Plans (Topic 962), Health and Welfare Benefit Plans (Topic 965): (Part I) Fully Benefit-Responsive Investment Contracts, (Part II) Plan Investment Disclosures, (Part III) Measurement Date Practical Expedient (consensuses of the FASB Emerging Issues Task Force).* Previously, plans were required to disclose (1) individual investments representing 5 percent or more of net assets available for benefits and (2) net appreciation or depreciation for investments by general type. The amendments in Part II of this update (1) eliminate the required disclosure related to individual investments and (2) removes the requirement to disaggregate net appreciation or depreciation for investments by general type. This update is effective for the Bank for the year ending December 31, 2016, and is not expected to have a material effect on the Bank's financial statements.

In January 2016, the FASB issued ASU 2016–01, *Financial Instruments – Overall (Subtopic 825–10): Recognition and Measurement of Financial Assets and Financial Liabilities.* The amendments in this update eliminate the requirement to disclose methods and significant assumptions used to estimate the fair value for financial instruments measured at amortized cost on the balance sheet. This update is effective for the Bank for the year ending December 31, 2019. The Bank is continuing to evaluate the effect of this new guidance on the Bank's financial statements.

In February 2016, the FASB issued ASU 2016–02, *Leases (Topic 842)*. This update revises the model to assess how a lease should be classified and provides guidance for lessees, requiring lessees to present right-of-use assets and lease liabilities on the balance sheet. The update is effective for the Bank for the year ended December 31, 2020, although earlier adoption is permitted. The Bank is continuing to evaluate the effect of this new guidance on its financial statements.

4 LOANS

Loans to Depository Institutions

The Bank offers primary, secondary, and seasonal loans to eligible borrowers (depository institutions that maintain reservable transaction accounts or nonpersonal time deposits and have established discount window borrowing privileges). Each program has its own interest rate and interest is accrued using the applicable interest rate established at least every 14 days by the Bank's board of directors, subject to review and determination by the Board of Governors. Primary and secondary loans are extended on a short-term basis, typically overnight, whereas seasonal loans may be extended for a period of up to nine months.

Primary, secondary, and seasonal loans are collateralized to the satisfaction of the Bank to reduce credit risk. Assets eligible to collateralize these loans include consumer, business, and real estate loans; Treasury securities; GSE debt securities; foreign sovereign debt; municipal, corporate, and state and local government obligations; asset-backed securities; corporate bonds; commercial paper; and bank-issued assets, such as certificates of deposit, bank notes, and deposit notes. Collateral is assigned a lending value that is deemed appropriate by the Bank, which is typically fair value reduced by a margin. Loans to depository institutions are monitored daily to ensure that borrowers continue to meet eligibility requirements for these programs. If a borrower no longer qualifies for these programs, the Bank will generally request full repayment of the outstanding loan or, for primary or seasonal loans, may convert the loan to a secondary credit loan. Collateral levels are reviewed daily against outstanding obligations, and borrowers that no longer have sufficient collateral to support outstanding loans are required to provide additional collateral or to make partial or full repayment.

The Bank had no loans outstanding as of December 31, 2015. Loans to depository institutions were $1 million as of December 31, 2014, with a remaining maturity within 15 days.

At December 31, 2015 and 2014, the Bank did not have any loans that were impaired, restructured, past due, or on non-accrual status, and no allowance for loan losses was required. There were no impaired loans during the years ended December 31, 2015 and 2014. Interest income attributable to loans to depository institutions was immaterial during the years ended December 31, 2015 and 2014.

5 SYSTEM OPEN MARKET ACCOUNT

a. Domestic Securities Holdings

The FRBNY conducts domestic open market operations and, on behalf of the Reserve Banks, holds the resulting securities in the SOMA.

During the year ended December 31, 2014, the FRBNY continued the purchase of Treasury securities and federal agency and GSE MBS under the large-scale asset purchase programs as directed by the FOMC, although at a reduced pace than previous years. In October 2014, the FOMC concluded its asset purchase program while maintaining its existing policy of reinvesting principal payments from its holdings of GSE debt securities and federal agency and GSE MBS and of rolling over maturing Treasury securities at auction. During the year ended December 31, 2015, the FRBNY continued the reinvestments.

The Bank's allocated share of activity related to domestic open market operations was 5.431 percent and 5.589 percent at December 31, 2015 and 2014, respectively.

The Bank's allocated share of Treasury securities, GSE debt securities, and federal agency and GSE MBS, net, excluding accrued interest, held in the SOMA at December 31 was as follows (in millions):

2015	Par	Unamortized premiums	Unaccreted discounts	Total amortized cost
Treasury securities				
Notes	$ 88,791	$ 1,137	$ (352)	$ 89,576
Bonds	44,905	6,193	(508)	50,590
Total Treasury securities	**$ 133,696**	**$ 7,330**	**$ (860)**	**$ 140,166**
GSE debt securities	**$ 1,789**	**$ 44**	**$ —**	**$ 1,833**
Federal agency and GSE MBS	**$ 94,911**	**$ 2,918**	**$ (40)**	**$ 97,789**

2014	Par	Unamortized premiums	Unaccreted discounts	Total amortized cost
Treasury securities				
Notes	$ 91,378	$ 1,547	$ (431)	$ 92,494
Bonds	46,189	6,965	(542)	52,612
Total Treasury securities	**$ 137,567**	**$ 8,512**	**$ (973)**	**$ 145,106**
GSE debt securities	**$ 2,162**	**$ 73**	**$ —**	**$ 2,235**
Federal agency and GSE MBS	**$ 97,073**	**$ 2,975**	**$ (55)**	**$ 99,993**

The FRBNY enters into transactions for the purchase of securities under agreements to resell and transactions to sell securities under agreements to repurchase as part of its monetary policy activities. Prior to December 17, 2015, these operations were for the purpose of further assessing the appropriate structure of such operations in supporting the implementation of monetary policy during normalization. From December 17, 2015 these operations have been undertaken as necessary to maintain the federal funds rate in a target range. In addition, transactions to sell securities under agreements to repurchase are entered into as part of a service offering to foreign official and international account holders.

There were no material transactions related to securities purchased under agreements to resell during the years ended December 31, 2015 and 2014. Financial information related to securities sold under agreements to repurchase for the years ended December 31 was as follows (in millions):

	Allocated to the Bank		Total SOMA	
	2015	2014	2015	2014
Primary dealers and expanded counterparties:				
Contract amount outstanding, end of year	$ 25,777	$ 22,172	$ 474,592	$ 396,705
Average daily amount outstanding, during the year	6,892	7,428	125,656	130,281
Maximum balance outstanding, during the year	25,777	22,172	474,592	396,705
Securities pledged (par value), end of year	23,787	20,413	437,961	365,235
Securities pledged (fair value), end of year	25,822	22,275	475,422	398,540
Foreign official and international accounts:				
Contract amount outstanding, end of year	$ 12,916	$ 6,323	$ 237,809	$ 113,132
Average daily amount outstanding, during the year	8,636	5,925	157,929	102,968
Maximum balance outstanding, during the year	12,916	7,348	237,809	122,232
Securities pledged (par value), end of year	12,510	6,056	230,333	108,355
Securities pledged (fair value), end of year	12,917	6,323	237,825	113,132
Total contract amount outstanding, end of year	**$ 38,693**	**$ 28,495**	**$ 712,401**	**$ 509,837**
Supplemental information—interest expense:				
Primary dealers and expanded counterparties	$ 4	$ 4	$ 84	$ 68
Foreign official and international accounts	9	3	164	44
Total interest expense — securities sold under agreements to repurchase	**$ 13**	**$ 7**	**$ 248**	**$ 112**

Securities pledged as collateral, at December 31, 2015 and 2014, consisted solely of Treasury securities. The contract amount outstanding as of December 31, 2015 of securities sold under agreements to repurchase that were transacted with primary dealers and expanded counterparties had a term of one business day and matured on January 4, 2016. The contract amount outstanding as of December 31, 2015 of securities sold under agreements to repurchase that were transacted with foreign official and international accounts had a term of one business day and matured on January 4, 2016.

The remaining maturity distribution of Treasury securities, GSE debt securities, federal agency and GSE MBS bought outright, and securities sold under agreements to repurchase that were allocated to the Bank at December 31, 2015 and 2014 was as follows (in millions):

	Within 15 days	16 days to 90 days	91 days to 1 year	Over 1 year to 5 years	Over 5 years to 10 years	Over 10 years	Total
December 31, 2015:							
Treasury securities (par value)	$ —	$ 2,097	$ 9,640	$ 60,742	$ 26,572	$ 34,645	$ 133,696
GSE debt securities (par value)	—	200	710	751	—	128	1,789
Federal agency and GSE MBS (par value)[1]	—	—	—	25	490	94,396	94,911
Securities sold under agreements to repurchase (contract amount)	38,693	—	—	—	—	—	38,693
December 31, 2014:							
Treasury securities (par value)	$ —	$ —	$ 197	$ 62,202	$ 38,376	$ 36,792	$ 137,567
GSE debt securities (par value)	61	40	220	1,710	—	131	2,162
Federal agency and GSE MBS (par value)[1]	—	—	—	1	361	96,711	97,073
Securities sold under agreements to repurchase (contract amount)	28,495	—	—	—	—	—	28,495

[1] The par amount shown for federal agency and GSE MBS is the remaining principal balance of the securities.

Federal agency and GSE MBS are reported at stated maturity in the table above. The estimated weighted average life of these securities, which differs from the stated maturity primarily because it factors in scheduled payments and prepayment assumptions, was approximately 6.5 and 5.7 years as of December 31, 2015 and 2014, respectively.

The amortized cost and par value of Treasury securities and GSE debt securities that were loaned from the SOMA under securities lending agreements, at December 31 were as follows (in millions):

	Allocated to the Bank		Total SOMA	
	2015	2014	2015	2014
Treasury securities (amortized cost)	$ 1,030	$ 623	$ 18,960	$ 11,144
Treasury securities (par value)	981	565	18,055	10,105
GSE debt securities (amortized cost)	8	35	146	633
GSE debt securities (par value)	7	34	137	616

Securities pledged as collateral by the counterparties in the securities lending arrangements at December 31, 2015 and 2014, consisted solely of Treasury securities. The securities lending agreements outstanding as of December 31, 2015 had a term of one business day and matured on January 4, 2016.

The FRBNY enters into commitments to buy and sell Treasury securities and records the related securities on a settlement-date basis. As of December 31, 2015, there were no outstanding commitments.

The FRBNY enters into commitments to buy and sell federal agency and GSE MBS and records the related securities on a settlement-date basis. As of December 31, 2015, the total purchase price of the federal agency and GSE MBS under outstanding purchase commitments was $22,187 million, none of which was related to dollar rolls. The total purchase price of outstanding purchase commitments allocated to the Bank was $1,205 million, none of which was related to dollar rolls. MBS commitments, which had contractual settlement dates extending through January 2016, are principally for the purchase of TBA MBS for which the number and identity of the pools that will be delivered to fulfill the commitment are unknown at the time of the trade. As of December 31, 2015, there were no outstanding sales commitments for federal agency and GSE MBS. These commitments are subject to varying degrees of off-balance-sheet market risk and counterparty credit risk that result from their future settlement. The FRBNY requires the posting of cash collateral for MBS commitments as part of its risk management practices used to mitigate the counterparty credit risk.

Other assets consists primarily of cash and short-term investments related to the federal agency and GSE MBS portfolio. Other liabilities, which are primarily related to federal agency and GSE MBS purchases and sales, includes the FRBNY's obligation to return cash margin posted by counterparties as collateral under commitments to purchase and sell federal agency and GSE MBS. In addition, other liabilities includes obligations that arise from the failure of a seller to deliver MBS to the FRBNY on the settlement date. Although the FRBNY has ownership of and records its investments in the MBS as of the contractual settlement date, it is not obligated to make payment until the securities are delivered, and the amount included in other liabilities represents the FRBNY's obligation to pay for the securities when delivered. The amount of other assets and other liabilities allocated to the Bank and held in the SOMA at December 31 was as follows (in millions):

	Allocated to the Bank		Total SOMA	
	2015	2014	2015	2014
Other assets:				
MBS portfolio related cash and short-term investments	$ 1	$ 2	$ 13	$ 28
Other	—	—	1	1
Total other assets	**$ 1**	**$ 2**	**$ 14**	**$ 29**
Other liabilities:				
Cash margin	$ 27	$ 44	$ 486	$ 793
Obligations from MBS transaction fails	1	2	16	30
Other	—	—	6	7
Total other liabilities	**$ 28**	**$ 46**	**$ 508**	**$ 830**

Accrued interest receivable on domestic securities holdings was $25,354 million and $25,561 million as of December 31, 2015 and 2014, respectively, of which $1,377 million and $1,429 million, respectively, was allocated to the Bank. These amounts are reported as a component of "System Open Market Account: Accrued interest receivable" in the Statements of Condition.

Information about transactions related to Treasury securities, GSE debt securities, and federal agency and GSE MBS during the years ended December 31, 2015 and 2014, is summarized as follows (in millions):

	Allocated to the Bank				
	Notes	Bonds	Total Treasury securities	GSE debt securities	Federal agency and GSE MBS
Balance at December 31, 2013	$ 92,968	$ 53,744	$ 146,712	$ 3,676	$ 95,377
Purchases[1]	9,712	5,030	14,742	—	27,038
Sales[1]	—	—	—	—	(2)
Realized gains, net[2]	—	—	—	—	—
Principal payments and maturities	(28)	—	(28)	(1,098)	(11,630)
Amortization of premiums and accretion of discounts, net	(319)	(583)	(902)	(34)	(411)
Inflation adjustment on inflation-indexed securities	28	75	103	—	—
Annual reallocation adjustment[3]	(9,867)	(5,654)	(15,521)	(309)	(10,379)
Balance at December 31, 2014	$ 92,494	$ 52,612	$ 145,106	$ 2,235	$ 99,993
Purchases[1]	149	41	190	—	19,537
Sales[1]	—	—	—	—	(26)
Realized gains, net[2]	—	—	—	—	1
Principal payments and maturities	(162)	(29)	(191)	(316)	(18,256)
Amortization of premiums and accretion of discounts, net	(300)	(562)	(862)	(28)	(641)
Inflation adjustment on inflation-indexed securities	2	6	8	—	—
Annual reallocation adjustment[3]	(2,607)	(1,478)	(4,085)	(58)	(2,819)
Balance at December 31, 2015	$ 89,576	$ 50,590	$ 140,166	$ 1,833	$ 97,789
Year-ended December 31, 2014					
Supplemental information—par value of transactions:					
Purchases[4]	$ 9,847	$ 4,920	$ 14,767	$ —	$ 26,129
Sales	—	—	—	—	(2)
Year-ended December 31, 2015					
Supplemental information—par value of transactions:					
Purchases[4]	$ 149	$ 42	$ 191	$ —	$ 18,853
Sales	—	—	—	—	(24)

[1] Purchases and sales may include payments and receipts related to principal, premiums, discounts, and inflation compensation adjustments to the basis of inflation-indexed securities. The amount reported as sales includes the realized gains and losses on such transactions. Purchases and sales exclude MBS TBA transactions that are settled on a net basis.

[2] Realized gains, net offset the amount of realized gains and losses included in the reported sales amount.

[3] Reflects the annual adjustment to the Bank's allocated portion of the related SOMA securities that results from the annual settlement of the interdistrict settlement account, as discussed in Note 3i.

[4] Includes inflation compensation.

	Total SOMA				
	Notes	Bonds	Total Treasury securities	GSE debt securities	Federal agency and GSE MBS
Balance at December 31, 2013	$ 1,495,115	$ 864,319	$ 2,359,434	$ 59,122	$ 1,533,860
Purchases[1]	165,306	85,826	251,132	—	466,384
Sales[1]	—	—	—	—	(29)
Realized gains, net[2]	—	—	—	—	—
Principal payments and maturities	(475)	—	(475)	(18,544)	(203,933)
Amortization of premiums and accretion of discounts, net	(5,545)	(10,132)	(15,677)	(588)	(7,199)
Inflation adjustment on inflation-indexed securities	500	1,327	1,827	—	—
Balance at December 31, 2014	$ 1,654,901	$ 941,340	$ 2,596,241	$ 39,990	$ 1,789,083
Purchases[1]	2,736	761	3,497	—	356,976
Sales[1]	—	—	—	—	(464)
Realized gains, net[2]	—	—	—	—	16
Principal payments and maturities	(2,977)	(543)	(3,520)	(5,733)	(333,441)
Amortization of premiums and accretion of discounts, net	(5,485)	(10,253)	(15,738)	(509)	(11,721)
Inflation adjustment on inflation-indexed securities	53	143	196	—	—
Balance at December 31, 2015	$ 1,649,228	$ 931,448	$ 2,580,676	$ 33,748	$ 1,800,449
Year-ended December 31, 2014					
Supplemental information—par value of transactions:					
Purchases[3]	$ 167,497	$ 83,739	$ 251,236	$ —	$ 450,633
Sales	—	—	—	—	(29)
Year-ended December 31, 2015					
Supplemental information—par value of transactions:					
Purchases[3]	$ 2,747	$ 766	$ 3,513	$ —	$ 344,505
Sales	—	—	—	—	(435)

[1] Purchases and sales may include payments and receipts related to principal, premiums, discounts, and inflation compensation adjustments to the basis of inflation-indexed securities. The amount reported as sales includes the realized gains and losses on such transactions. Purchases and sales exclude MBS TBA transactions that are settled on a net basis.

[2] Realized gains, net offset the amount of realized gains and losses included in the reported sales amount.

[3] Includes inflation compensation.

b. Foreign Currency Denominated Investments

The FRBNY conducts foreign currency operations and, on behalf of the Reserve Banks, holds the resulting foreign currency denominated investments in the SOMA.

The FRBNY holds foreign currency deposits with foreign central banks and the Bank for International Settlements and invests in foreign government debt instruments of Germany, France, and Japan. These foreign government debt instruments are backed by the full faith and credit of the issuing foreign governments. In addition, the FRBNY may enter into transactions to purchase Euro-denominated government debt securities under agreements to resell for which the accepted collateral is the debt instruments issued by the governments of Belgium, France, Germany, Italy, the Netherlands, and Spain, which are backed by the full faith and credit of those issuing governments.

At December 31, 2015 and 2014, there were no securities purchased under agreements to resell outstanding and, consequently, no related foreign securities held as collateral.

The Bank's allocated share of activity related to foreign currency operations was 22.949 percent and 20.853 percent at December 31, 2015 and 2014, respectively.

Information about foreign currency denominated investments valued at amortized cost and at foreign currency market exchange rates at December 31 was as follows (in millions):

	Allocated to the Bank		Total SOMA	
	2015	2014	2015	2014
Euro:				
Foreign currency deposits	$ 1,427	$ 1,446	$ 6,218	$ 6,936
German government debt instruments	519	520	2,261	2,494
French government debt instruments	763	769	3,325	3,687
Japanese yen:				
Foreign currency deposits	589	537	2,568	2,576
Japanese government debt instruments	1,192	1,086	5,195	5,207
Total	**$ 4,490**	**$ 4,358**	**$ 19,567**	**$ 20,900**

Accrued interest receivable on foreign currency denominated investments was $64 million and $83 million as of December 31, 2015 and 2014, respectively, of which $15 million and $17 million, respectively, was allocated to the Bank. These amounts are reported as a component of "System Open Market Account: Accrued interest receivable" in the Statements of Condition.

The remaining maturity distribution of foreign currency denominated investments that were allocated to the Bank at December 31, 2015 and 2014, was as follows (in millions):

	Within 15 days	16 days to 90 days	91 days to 1 year	Over 1 year to 5 years	Over 5 years to 10 years	Total
December 31, 2015:						
Euro	$ 490	$ 1,019	$ 241	$ 878	$ 81	$ 2,709
Japanese yen	628	80	368	705	—	1,781
Total	**$ 1,118**	**$ 1,099**	**$ 609**	**$ 1,583**	**$ 81**	**$ 4,490**
December 31, 2014:						
Euro	$ 758	$ 586	$ 343	$ 1,048	$ —	$ 2,735
Japanese yen	575	82	321	645	—	1,623
Total	**$ 1,333**	**$ 668**	**$ 664**	**$ 1,693**	**$ —**	**$ 4,358**

There were no foreign exchange contracts related to foreign currency operations outstanding as of December 31, 2015.

The FRBNY enters into commitments to buy foreign government debt instruments and records the related securities on a settlement-date basis. During 2015, there were purchases and maturities of foreign government debt instruments of $3,288 million and $3,155 million, respectively, of which $747 million and $714 million, respectively, were allocated to the Bank. There were no sales of foreign government debt instruments in 2015.

In connection with its foreign currency activities, the FRBNY may enter into transactions that are subject to varying degrees of off-balance-sheet market risk and counterparty credit risk that result from their future settlement. The FRBNY controls these risks by obtaining credit approvals, establishing transaction limits, receiving collateral in some cases, and performing monitoring procedures.

Foreign currency working balances held and foreign exchange contracts executed by the Bank to facilitate international payments and currency transactions made on behalf of foreign central banks and U.S. official institution customers were not material as of December 31, 2015 and 2014.

c. Central Bank Liquidity Swaps

U.S. Dollar Liquidity Swaps

The Bank's allocated share of U.S. dollar liquidity swaps was 22.949 percent and 20.853 percent at December 31, 2015 and 2014, respectively.

The total foreign currency held under U.S. dollar liquidity swaps in the SOMA at December 31, 2015 and 2014, was $997 million and $1,528 million, respectively, of which $229 million and $319 million, respectively, was allocated to the Bank.

The remaining maturity distribution of U.S. dollar liquidity swaps that were allocated to the Bank at December 31 was as follows (in millions):

	2015	2014
	Within 15 days	Within 15 days
Euro	$ 212	$ —
Japanese yen	17	319
Total	**$ 229**	**$ 319**

Foreign Currency Liquidity Swaps

At December 31, 2015 and 2014, there was no balance outstanding related to foreign currency liquidity swaps.

d. Fair Value of SOMA Assets and Liabilities

The fair value amounts below are presented solely for informational purposes and are not intended to comply with the fair value disclosures required by FASB Accounting Standards Codification (ASC) Topic 820 (ASC 820), *Fair Value Measurement*. Although the fair value of SOMA security holdings can be substantially greater than or less than the recorded value at any point in time, these unrealized gains or losses have no effect on the ability of the Reserve Banks, as the central bank, to meet their financial obligations and responsibilities. Because SOMA securities are recorded at amortized cost, cumulative unrealized gains (losses) are not recognized in the Statements of Condition and the changes in cumulative unrealized gains (losses) are not recognized in the Statements of Income and Comprehensive Income.

The fair value of the Treasury securities, GSE debt securities, federal agency and GSE MBS, and foreign government debt instruments held in the SOMA is subject to market risk, arising from movements in market variables such as interest rates and credit risk. The fair value of federal agency and GSE MBS is also affected by the expected rate of prepayments of mortgage loans underlying the securities. The fair value of foreign government debt instruments is also affected by currency risk. Based on evaluations performed as of December 31, 2015 and 2014, there are no credit impairments of SOMA securities holdings.

The following table presents the amortized cost, fair value, and cumulative unrealized gains (losses) on the Treasury securities, GSE debt securities, and federal agency and GSE MBS held in the SOMA at December 31 (in millions):

	Allocated to the Bank					
	2015			2014		
	Amortized cost	Fair value	Cumulative unrealized gains (losses)	Amortized cost	Fair value	Cumulative unrealized gains (losses)
Treasury securities:						
Notes	$ 89,576	$ 90,671	$ 1,095	$ 92,494	$ 94,085	$ 1,591
Bonds	50,590	54,667	4,077	52,612	58,848	6,236
Total Treasury securities	$ 140,166	$ 145,338	$ 5,172	$ 145,106	$ 152,933	$ 7,827
GSE debt securities	1,833	1,910	77	2,235	2,375	140
Federal agency and GSE MBS	97,789	98,321	532	99,993	101,752	1,759
Total domestic SOMA portfolio securities holdings	**$ 239,788**	**$ 245,569**	**$ 5,781**	**$ 247,334**	**$ 257,060**	**$ 9,726**
Memorandum—Commitments for:						
Purchases of Treasury securities	$ —	$ —	$ —	$ —	$ —	$ —
Purchases of Federal agency and GSE MBS	1,205	1,204	(1)	1,604	1,610	6
Sales of Federal agency and GSE MBS	—	—	—	—	—	—

	Total SOMA					
	2015			2014		
	Amortized cost	Fair value	Cumulative unrealized gains (losses)	Amortized cost	Fair value	Cumulative unrealized gains (losses)
Treasury securities:						
Notes	$ 1,649,228	$ 1,669,395	$ 20,167	$ 1,654,901	$ 1,683,377	$ 28,476
Bonds	931,448	1,006,514	75,066	941,340	1,052,916	111,576
Total Treasury securities	$ 2,580,676	$ 2,675,909	$ 95,233	$ 2,596,241	$ 2,736,293	$ 140,052
GSE debt securities	33,748	35,165	1,417	39,990	42,499	2,509
Federal agency and GSE MBS	1,800,449	1,810,256	9,807	1,789,083	1,820,544	31,461
Total domestic SOMA portfolio securities holdings	**$ 4,414,873**	**$ 4,521,330**	**$ 106,457**	**$ 4,425,314**	**$ 4,599,336**	**$ 174,022**
Memorandum—Commitments for:						
Purchases of Treasury securities	$ —	$ —	$ —	$ —	$ —	$ —
Purchases of Federal agency and GSE MBS	22,187	22,170	(17)	28,692	28,803	111
Sales of Federal agency and GSE MBS	—	—	—	—	—	—

The fair value of Treasury securities and GSE debt securities was determined using pricing services that provide market consensus prices based on indicative quotes from various market participants. The fair value of federal agency and GSE MBS was determined using a pricing service that utilizes a model-based approach that considers observable inputs for similar securities.

The cost bases of securities purchased under agreements to resell, securities sold under agreements to repurchase, central bank liquidity swaps and other investments held in the SOMA domestic portfolio approximate fair value. Due to the short-term nature of these agreements and the defined amount that will be received upon settlement, the cost basis is estimated to approximate fair value.

At December 31, 2015 and 2014, the fair value of foreign currency denominated investments was $19,630 million and $20,996 million, respectively, of which $4,505 million and $4,378 million, respectively, was allocated to the Bank. The fair value of foreign government debt instruments was determined using pricing services that provide market consensus prices based on indicative quotes from various market participants. The fair value of foreign currency deposits and securities purchased under agreements to resell was determined by reference to market interest rates.

The following table provides additional information on the amortized cost and fair values of the federal agency and GSE MBS portfolio at December 31 (in millions):

	2015		2014	
Distribution of MBS holdings by coupon rate	Amortized cost	Fair value	Amortized cost	Fair value
Allocated to the Bank:				
2.0%	$ 608	$ 597	$ 715	$ 705
2.5%	6,329	6,247	6,406	6,342
3.0%	30,113	29,507	28,688	28,296
3.5%	31,469	31,607	26,900	27,352
4.0%	19,615	20,019	23,924	24,659
4.5%	6,296	6,737	8,712	9,381
5.0%	2,658	2,853	3,663	3,953
5.5%	605	651	851	918
6.0%	84	90	118	128
6.5%	12	13	16	18
Total	**$ 97,789**	**$ 98,321**	**$ 99,993**	**$ 101,752**
Total SOMA:				
2.0%	$ 11,198	$ 10,993	$ 12,788	$ 12,618
2.5%	116,527	115,018	114,609	113,468
3.0%	554,430	543,270	513,289	506,280
3.5%	579,403	581,940	481,305	489,390
4.0%	361,149	368,576	428,047	441,204
4.5%	115,914	124,043	155,867	167,844
5.0%	48,931	52,523	65,544	70,719
5.5%	11,138	11,989	15,232	16,414
6.0%	1,542	1,666	2,110	2,287
6.5%	217	238	292	320
Total	**$ 1,800,449**	**$ 1,810,256**	**$ 1,789,083**	**$ 1,820,544**

The following tables present the realized gains (losses) and the change in the cumulative unrealized gains (losses) related to SOMA domestic securities holdings during the years ended December 31, 2015 and 2014 (in millions):

Allocated to the Bank				
	2015		2014	
	Realized gains[1]	Change in cumulative unrealized gains (losses)[2, 3]	Realized gains[1]	Change in cumulative unrealized gains (losses)[2, 3]
Treasury securities	$ —	$ (2,359)	$ —	$ 9,173
GSE debt securities	—	(60)	—	(34)
Federal agency and GSE MBS	2	(1,155)	5	4,056
Total	**$ 2**	**$ (3,574)**	**$ 5**	**$ 13,195**

Total SOMA				
	2015		2014	
	Realized gains[1]	Change in cumulative unrealized gains (losses)[2]	Realized gains[1]	Change in cumulative unrealized gains (losses)[2]
Treasury securities	$ —	$ (44,819)	$ —	$ 158,150
GSE debt securities	—	(1,092)	—	(605)
Federal agency and GSE MBS	43	(21,654)	81	69,749
Total	**$ 43**	**$ (67,565)**	**$ 81**	**$ 227,294**

[1] Realized gains are reported in "Non-interest loss: System Open Market Account: Federal agency and government-sponsored enterprise mortgage-backed securities gains, net" in the Statements of Income and Comprehensive Income.

[2] Because SOMA securities are recorded at amortized cost, the change in the cumulative unrealized gains (losses) is not reported in the Statements of Income and Comprehensive Income.

[3] The amount reported as change in cumulative unrealized gains (losses) allocated to the Bank is affected by the annual adjustment to the Bank's allocated portion of the related SOMA securities, as discussed in Note 3f.

The amount of change in cumulative unrealized gains (losses) position, net, related to foreign currency denominated investments was a loss of $33 million and a gain of $18 million for the years ended December 31, 2015 and 2014, respectively, of which $7 million and $4 million, respectively, were allocated to the Bank.

ASC 820 defines fair value as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. ASC 820 establishes a three-level fair value hierarchy that distinguishes between assumptions developed using market data obtained from independent sources (observable inputs) and the Bank's assumptions developed using the best information available in the circumstances (unobservable inputs). The three levels established by ASC 820 are described as follows:

- Level 1 – Valuation is based on quoted prices for identical instruments traded in active markets.
- Level 2 – Valuation is based on quoted prices for similar instruments in active markets, quoted prices for identical or similar instruments in markets that are not active, and model-based valuation techniques for which all significant assumptions are observable in the market.
- Level 3 – Valuation is based on model-based techniques that use significant inputs and assumptions not observable in the market. These unobservable inputs and assumptions reflect the Bank's estimates of inputs and assumptions that market participants would use in pricing the assets and liabilities. Valuation techniques include the use of option pricing models, discounted cash flow models, and similar techniques.

Treasury securities, GSE debt securities, federal agency and GSE MBS, and foreign government debt instruments are classified as Level 2 within the ASC 820 hierarchy because the fair values are based on indicative quotes and other observable inputs obtained from independent pricing services. The fair value hierarchy level of SOMA financial assets is not necessarily an indication of the risk associated with those assets.

6 BANK PREMISES, EQUIPMENT, AND SOFTWARE

Bank premises and equipment at December 31 were as follows (in millions):

	2015	2014
Bank premises and equipment:		
Land and land improvements	$ 48	$ 48
Buildings	250	247
Building machinery and equipment	87	86
Construction in progress	1	2
Furniture and equipment	381	373
Subtotal	**767**	**756**
Accumulated depreciation	(425)	(407)
Bank premises and equipment, net	**$ 342**	**$ 349**
Depreciation expense, for the years ended December 31	**$ 57**	**$ 53**

Bank premises and equipment at December 31 included the following amounts for capitalized leases (in millions):

	2015	2014
Leased premises and equipment under capital leases	$ 25	$ 26
Accumulated depreciation	(21)	(20)
Leased premises and equipment under capital leases, net	**$ 4**	**$ 6**
Depreciation expense related to leased premises and equipment under capital leases, for the years ended December 31	**$ 4**	**$ 6**

The Bank leases space to outside tenants with remaining lease terms ranging from one to eight years. Rental income from such leases was $2 million and $1 million for the years ended December 31, 2015 and 2014, respectively, and is reported as a component of "Non-interest loss: Other" in the Statements of Income and Comprehensive Income. Future minimum lease payments that the Bank will receive under noncancelable lease agreements in existence at December 31, 2015, are as follows (in millions):

2016	$ 2
2017	2
2018	1
2019	1
2020	1
Thereafter	3
Total	**$ 10**

The Bank had capitalized software assets, net of amortization, of $32 million and $35 million at December 31, 2015 and 2014, respectively. Amortization expense was $17 million for each of the years ended December 31, 2015 and 2014. Capitalized software assets are reported as a component of "Other assets" in the Statements of Condition and the related amortization is reported as a component of "Operating expenses: Other" in the Statements of Income and Comprehensive Income.

7 COMMITMENTS AND CONTINGENCIES

In conducting its operations, the Bank enters into contractual commitments, normally with fixed expiration dates or termination provisions, at specific rates and for specific purposes.

At December 31, 2015, the Bank was obligated under noncancelable leases for premises and equipment with remaining terms ranging from one to approximately four years.

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 $923 thousand and $380 thousand for the years ended December 31, 2015 and 2014, respectively. Certain of the Bank's leases have options to renew.

Future minimum lease payments under noncancelable operating leases, net of sublease rentals, with terms of one year or more, at December 31, 2015, were not material.

At December 31, 2015, there were no material unrecorded unconditional purchase commitments or obligations in excess of one year.

Under the Insurance Agreement of the Reserve Banks, each of the Reserve Banks has agreed to bear, on a per-incident basis, a share of certain losses in excess of 1 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 of a Reserve Bank's capital paid-in 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 the agreement at December 31, 2015 and 2014.

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 legal actions 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 three defined benefit retirement plans to its employees, based on length of service and level of compensation. Substantially all of the employees of the Reserve Banks, Board of Governors, and Office of Employee Benefits of the Federal Reserve System (OEB) participate in the Retirement Plan for Employees of the Federal Reserve System (System Plan).[1] Under the Dodd-Frank Act, newly hired Bureau employees are eligible to participate in the System Plan and, during the years ended December 31, 2015 and 2014, certain costs associated with the System Plan were reimbursed by the Bureau. In addition, employees at certain compensation levels participate in the Benefit Equalization Retirement Plan (BEP) and certain Reserve Bank officers participate in the Supplemental Retirement Plan for Select Officers of the Federal Reserve Banks (SERP).

The FRBNY, on behalf of the System, recognizes the net asset or net liability and costs associated with the System Plan in its consolidated financial statements. The Bank reports the net cost related to the BEP and SERP as a component of "Operating expenses: Salaries and benefits" in its Statements of Income and Comprehensive Income and reports the net liability as a component of "Accrued benefit costs" in its Statements of Condition.

The Bank's projected benefit obligation, funded status, and net pension expenses for the BEP and the SERP at December 31, 2015 and 2014, and for the years then ended, were not material.

Thrift Plan

Employees of the Bank participate in the defined contribution Thrift Plan for Employees of the Federal Reserve System (Thrift Plan). The Bank matches 100 percent of the first 6 percent of employee contributions from the date of hire and provides an automatic employer contribution of 1 percent of eligible pay. The Bank's Thrift Plan contributions totaled $18 million and $17 million for the years ended December 31, 2015 and 2014, respectively, and are reported as a component of "Operating expenses: Salaries and benefits" in the Statements of Income and Comprehensive Income.

9 POSTRETIREMENT BENEFITS OTHER THAN RETIREMENT PLANS AND POSTEMPLOYMENT BENEFITS

Postretirement Benefits Other Than Retirement Plans

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

The Bank and plan participants fund benefits payable under the medical and life insurance plans as due and the plans have no assets.

[1] The OEB was established by the System to administer selected System benefit plans.

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

	2015	2014
Accumulated postretirement benefit obligation at January 1	$ 273.6	$ 233.2
Service cost benefits earned during the period	13.8	11.7
Interest cost on accumulated benefit obligation	11.3	11.7
Net actuarial (gain) loss	(22.5)	24.4
Contributions by plan participants	3.0	3.0
Benefits paid	(12.2)	(11.1)
Medicare Part D subsidies	0.7	0.7
Plan amendments	—	—
Accumulated postretirement benefit obligation at December 31	**$ 267.7**	**$ 273.6**

At December 31, 2015 and 2014, the weighted-average discount rate assumptions used in developing the postretirement benefit obligation were 4.31 percent and 3.96 percent, respectively.

Discount rates reflect yields available on high-quality corporate bonds that would generate the cash flows necessary to pay the plan's benefits when due. The System Plan discount rate assumption setting convention uses an unrounded rate.

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

	2015	2014
Fair value of plan assets at January 1	$ —	$ —
Contributions by the employer	8.5	7.4
Contributions by plan participants	3.0	3.0
Benefits paid	(12.2)	(11.1)
Medicare Part D subsidies	0.7	0.7
Fair value of plan assets at December 31	**$ —**	**$ —**
Unfunded obligation and accrued postretirement benefit cost	**$ 267.7**	**$ 273.6**
Amounts included in accumulated other comprehensive loss are shown below:		
Prior service cost	$ 2.3	$ 5.7
Net actuarial loss	(31.8)	(58.1)
Total accumulated other comprehensive loss	**$ (29.5)**	**$ (52.4)**

Accrued postretirement benefit costs are reported as a component of "Accrued benefit costs" in the Statements of Condition.

For measurement purposes, the assumed health-care cost trend rates at December 31 are provided in the table below. The current health-care cost trend rate for next year is expected to decline ratably each year until achieving the ultimate trend rate in 2022:

	2015	2014
Health-care cost trend rate assumed for next year	7.00%	6.60%
Rate to which the cost trend rate is assumed to decline (the ultimate trend rate)	4.75%	4.75%
Year that the rate reaches the ultimate trend rate	2022	2019

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, 2015 (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	$ 5.2	$ (4.1)
Effect on accumulated postretirement benefit obligation	41.8	(34.1)

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

	2015	2014
Service cost-benefits earned during the period	$ 13.8	$ 11.7
Interest cost on accumulated benefit obligation	11.3	11.7
Amortization of prior service cost	(3.5)	(4.0)
Amortization of net actuarial loss	4.0	1.9
Net periodic postretirement benefit expense	**$ 25.6**	**$ 21.3**

Estimated amounts that will be amortized from accumulated other comprehensive loss into net periodic postretirement benefit expense in 2016 are shown below:

Prior service cost	$ (1.8)
Net actuarial loss	0.6
Total	**$ (1.2)**

Net postretirement benefit costs are actuarially determined using a January 1 measurement date. At January 1, 2015 and 2014, the weighted-average discount rate assumptions used to determine net periodic postretirement benefit costs were 3.96 percent and 4.79 percent, respectively.

Net periodic postretirement benefit expense is reported as a component of "Operating expenses: Salaries and benefits" in the Statements of Income and Comprehensive Income.

The Medicare Prescription Drug, Improvement and Modernization Act of 2003 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. The benefits provided under the Bank's plan to certain participants are at least actuarially equivalent to the Medicare Part D prescription drug benefit. The estimated effects of the subsidy are reflected in actuarial gain in the accumulated postretirement benefit obligation and net periodic postretirement benefit expense.

Federal Medicare Part D subsidy receipts were $557 thousand and $725 thousand in the years ended December 31, 2015 and 2014, respectively. Expected receipts in 2016, related to benefits paid in the years ended December 31, 2015 and 2014, are $207 thousand and $175 thousand, respectively.

Following is a summary of expected postretirement benefit payments (in millions):

	Without subsidy	With subsidy
2016	$ 10.0	$ 9.3
2017	10.9	10.1
2018	11.7	10.9
2019	12.6	11.6
2020	13.5	12.4
2021–2025	83.3	76.3
Total	**$ 142.0**	**$ 130.6**

Postemployment Benefits

The Bank offers benefits to former qualifying or inactive employees. Postemployment benefit costs are actuarially determined using a December 31 measurement date and include the cost of medical, dental, and vision insurance; survivor income; disability benefits; and self-insured workers' compensation expenses. The accrued postemployment benefit costs recognized by the Bank at December 31, 2015 and 2014, were $21 million and $23 million, respectively. This cost is included as a component of "Accrued benefit costs" in the Statements of Condition. Net periodic postemployment benefit expense included in 2015 and 2014 operating expenses were $1 million and $5 million, respectively, and are recorded as a component of "Operating expenses: Salaries and benefits" in the Statements of Income and Comprehensive Income.

10 ACCUMULATED OTHER COMPREHENSIVE INCOME AND OTHER COMPREHENSIVE INCOME

Following is a reconciliation of beginning and ending balances of accumulated other comprehensive loss as of December 31 (in millions):

	2015	2014
	Amount related to postretirement benefits other than retirement plans	Amount related to postretirement benefits other than retirement plans
Balance at January 1	$ (52)	$ (26)
Change in funded status of benefit plans:		
Amortization of prior service cost	(3)[1]	(4)[1]
Change in prior service costs related to benefit plans	(3)	(4)
Net actuarial gain (loss) arising during the year	22	(24)
Amortization of net actuarial loss	4[1]	2[1]
Change in actuarial losses related to benefit plans	26	(22)
Change in funded status of benefit plans—other comprehensive income (loss)	23	(26)
Balance at December 31	**$ (29)**	**$ (52)**

[1] Reclassification is reported as a component of "Operating expenses: Salaries and benefits" in the Statements of Income and Comprehensive Income.

Additional detail regarding the classification of accumulated other comprehensive loss is included in Note 9.

11 BUSINESS RESTRUCTURING CHARGES

In 2014, the Treasury announced a plan to consolidate the number of Reserve Banks providing fiscal agent services to the Treasury from ten to four. As a result of this initiative, the Automated Standard Application for Payments operations and the International Treasury Services Operations performed by the Bank will be transitioned to the Federal Reserve Bank of Kansas City; the Intragovernmental Payments and Collections operations performed by the Bank will be transitioned to the Federal Reserve Bank of St. Louis; and the Direct Voucher Service operations performed by the Bank will be transitioned to the Federal Reserve Bank of Cleveland.

The Bank had no significant business restructuring charges in 2015.

Following is a summary of financial information related to the restructuring plans (in millions):

	2014 restructuring plans
Information related to restructuring plans as of December 31, 2015:	
Total expected costs related to restructuring activity	$ 2.6
Estimated future costs related to restructuring activity	0.3
Expected completion date	2017
Reconciliation of liability balances:	
Balance at December 31, 2013	$ —
Employee separation costs	4.4
Payments	(0.1)
Balance at December 31, 2014	$ 4.3
Employee separation costs	0.5
Adjustments	(2.6)
Payments	(0.4)
Balance at December 31, 2015	**$ 1.8**

Employee separation costs are primarily severance costs for identified staff reductions associated with the announced restructuring plans. Separation costs that are provided under terms of ongoing benefit arrangements are recorded based on the accumulated benefit earned by the employee. Separation costs that are provided under the terms of one-time benefit arrangements are generally measured based on the expected benefit as of the termination date and recorded ratably over the period to termination. Restructuring costs related to employee separations are reported as a component of "Operating expenses: Salaries and benefits" in the Statements of Income and Comprehensive Income.

Adjustments to the accrued liability are primarily due to changes in the estimated restructuring costs and are shown as a component of the appropriate expense category in the Statements of Income and Comprehensive Income.

Costs associated with enhanced pension benefits for all Reserve Banks are recorded on the books of the FRBNY as discussed in Note 8.

12 DISTRIBUTION OF COMPREHENSIVE INCOME

The following table presents the distribution of the Bank's comprehensive income for the years ended December 31 (in millions):

	2015	2014
Dividends on capital stock	$ 395	$ 355
Transfer (from) to surplus	(4,327)	821
Earnings remittances to the Treasury:		
Interest on Federal Reserve notes	4,112	3,974
Required by the Federal Reserve Act, as amended by the FAST Act	4,715	—
Total distribution	**$ 4,895**	**$ 5,150**

Before enactment of the FAST Act, the amount reported as transfer (from) to surplus represented the amount necessary to equate surplus with capital paid-in, in accordance with the Board of Governor's policy. Subsequent to the enactment of the FAST Act, the amount reported as transfer (from) to surplus represents the amount necessary to maintain surplus at an amount equal to the Bank's allocated portion of the aggregate surplus limitation.

On December 28, 2015, the Reserve Banks reduced the aggregate surplus to the $10 billion limit in the FAST Act by remitting $19.3 billion to the Treasury. The Bank's share of this remittance was $4.3 billion, which is reported as a component of "Earnings remittances to the Treasury: Required by the Federal Reserve Act, as amended by the FAST Act" in the Bank's Statements of Income and Comprehensive Income, and in the table above.

13 SUBSEQUENT EVENTS

The FAST Act includes provisions that, effective on January 1, 2016, will change the rate of dividends paid to member banks by the Bank. See Note 3I for additional information on these FAST Act provisions.

There were no other subsequent events that require adjustments to or disclosures in the financial statements as of December 31, 2015. Subsequent events were evaluated through March 8, 2016, which is the date that the financial statements were available to be issued.

The Federal Reserve Bank of Richmond *2015 Annual Report* was produced by the Research Department, Publications Division.

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DESIGN: MillerCox Design, Inc.

PHOTOGRAPHY: Michael Batts and Larry Cain

PRINTING: Federal Reserve Bank of Richmond

Special thanks to Gina Karp, Lisa Kenney, Joseph Mengedoth, Karl Rhodes, and Jessie Romero.

The Annual Report also is available on the Bank's website, www.richmondfed.org.

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