Falling Short

Why Isn’t the U.S. Producing More College Graduates?
About the Cover: Blackboards were state-of-the-art teaching aids in 1902, when this two-room schoolhouse opened in Henrico County, Virginia. Deep Run School offered seven grades of instruction, which would have completed the formal education of many of its students. The chart on the cover shows that the average person born in the first decade of the twentieth century in the United States obtained about nine years of schooling by age thirty-five. Educational achievement increased steadily for the next four decades before leveling off between thirteen years and fourteen years of schooling for Americans born after World War II. See the essay that begins on page 4.

About the Richmond Fed

MISSION: As a regional Reserve Bank, we serve the public by fostering the stability, integrity, and efficiency of our nation’s monetary, financial, and payments systems.

VISION: To be an innovative policy and services leader for America’s economy.

KEY FUNCTIONS: We contribute to the formulation of monetary policy. We supervise and regulate banks as well as bank and savings and loan holding companies that are headquartered in the Fifth Federal Reserve District. We process currency and electronic payments for banks and provide financial services to the U.S. Treasury. We also work with a wide variety of partners to strengthen communities in the Fifth District.
Contents

Message from the Board of Directors ........................................................................................................2

Message from the Interim President ...........................................................................................................3

FEATURE ESSAY
Falling Short: Why Isn’t the U.S. Producing More College Graduates? ........................................4

Fifth District Economic Report: Fifth District Economy Gains Strength in 2017 ..........................17

Bank at Work: The Richmond Fed Operates Around the Clock .........................................................22

Boards, Councils, Officers, and Senior Professionals .............................................................................26
  Federal Reserve Bank of Richmond Board .............................................................................................27
  Baltimore Branch Board .......................................................................................................................28
  Charlotte Branch Board ......................................................................................................................29
  Community Depository Institutions Advisory Council .................................................................30
  Community Investment Council .........................................................................................................30
  Payments Advisory Council .................................................................................................................31
  Management Committee ...................................................................................................................32
  Bank Officers and Senior Professionals ...............................................................................................33
  National IT Management Council ......................................................................................................34
  National IT Officers and Senior Professionals ...................................................................................35

Financial Statements ...............................................................................................................................36
Choosing a New President to Lead the Richmond Fed

The board of directors of a Federal Reserve Bank serves many roles. Directors provide information to Bank leaders about economic conditions around the Fifth District, set the discount rate on loans to commercial banks and other depository institutions every two weeks with the approval of the Board of Governors, and oversee the operations and longer-term direction of the Bank. In 2017, the Richmond Board was encouraged by the progress made on critical initiatives, such as the National IT strategic plan, cybersecurity, and spending stewardship, among others. The District leadership team met the highest standards for policy, research, and operational effectiveness. The team also continuously demonstrated its commitment to Federal Reserve System partnerships.

Last year, the directors were responsible for choosing a new Bank president who will lead the institution, be an important voice in the Fifth District (and have a keen ear for input provided by others in the region), represent the Bank at Federal Open Market Committee (FOMC) meetings, and continue the Bank’s commitment to developing and maintaining a diverse and inclusive workplace.

The Board engaged a search firm to help identify a diverse and qualified candidate pool. In December, we chose Tom Barkin to become the Bank’s eighth president and chief executive officer. Tom joined the Bank on January 1, 2018, and has moved quickly forward. Among his immediate orders of business was to prepare to vote at his first FOMC meeting at the end of January. He has spent considerable time learning from people around the Bank—getting to know them personally, understanding their roles, and listening to what they have to say about our strengths and our opportunities for improvement. He has been out in our District as well, engaging with business and community leaders.

Tom joined the Bank after working for McKinsey & Company, a worldwide management consulting firm. Immediately prior, he was a senior partner and the chief risk officer at McKinsey. He previously served as its chief financial officer and oversaw its offices in the southern United States. Tom also served on the Board of Directors of the Federal Reserve Bank of Atlanta from 2009 through 2014, chairing the Board during 2013–14. Tom’s wealth of experience made him an excellent candidate, and we are excited about the leadership he brings to the Bank.

We would like to recognize and thank Mark Mullinix for his outstanding service as interim president. We congratulate him and wish him all the best as he retires from his role as first vice president in June 2018.

Mark and others throughout the Bank worked hard to keep things running smoothly during a year of significant change. The Bank is in a strong position going forward, and we welcome the opportunity to continue to serve the people of the Fifth District and the nation.

Margaret G. Lewis
Chair of the Board

Kathy J. Warden
Deputy Chair of the Board
Why isn't the United States producing more college graduates? That’s the question asked by Urvi Neelakantan and Jessie Romero in this year’s Annual Report essay. It might seem like a surprising question—after all, the share of the adult population with a college degree is at its highest point ever. But there is reason to believe the supply of college graduates isn’t keeping up with our economy’s demand for them.

One piece of evidence is the growth and persistence over the past several decades of the “wage gap”—the difference in earnings between workers with and without a four-year college degree. Economists have found that for much of U.S. history, differences in earnings can be explained by the basics of supply and demand. A consistently higher “price” for the labor of more-educated workers thus suggests that the demand for educated workers is outstripping the supply.

Why does that matter? Education has important implications for economic growth and continued improvements in our standards of living. In large part, growth is driven by increases in productivity, which in turn depend on the skills and knowledge we possess—what economists call “human capital.” Human capital can be acquired in many ways, but education is a key component. Data suggest that productivity growth has been slowing since the early 2000s, and one factor might be slower growth in the United States’ stock of human capital. In short, failing to meet our economy’s demand for skilled workers might be hindering economic growth.

Of course, education also has important implications for the lives of individuals. On average, college graduates earn more money than nongraduates, and they are more likely to be employed. College isn’t necessarily the right path for everyone, but it’s essential to identify any barriers that might prevent some students from achieving their full potential.

An additional concern is the high proportion of students who enroll in college but do not graduate. A variety of factors contribute to students leaving college, but, as Urvi and Jessie discuss, a key factor seems to be inadequate preparation during students’ K-12 years. The authors also discuss how K-12 preparation varies with socioeconomic status and how “school-choice” initiatives are intended to provide more children with access to high-quality schools.

Education is incredibly complex—no single solution will be right for all students, and no single essay can hope to cover all possible solutions. Continued research is vital to our society’s well-being, and we hope you find this year’s essay an interesting and informative introduction to the topic.

Additionally, new to this year’s Annual Report is “Bank at Work,” which highlights the Richmond Fed’s three primary functions as well as its community outreach work and support services. The article may introduce you to our roles and responsibilities or simply serve as a reminder of the services performed by our Reserve Bank and the Federal Reserve System.

Mark L. Mullinix
Interim President and Chief Operating Officer
Why Isn’t the U.S. Producing More College Graduates?

By Urvi Neelakantan and Jessie Romero

For roughly four decades, the gap in earnings between workers with and without a college degree has been large. This persistent earnings gap is unusual from a historical perspective—in previous instances, workers have responded by increasing their level of education, and the resulting increase in the supply of more-educated workers has narrowed the gap over time. Over the past four decades, students have indeed enrolled in college at increasing rates; however, a large proportion of them have failed to earn degrees. Partly as a result of this bottleneck, the earnings gap has endured.

Why isn’t the U.S. producing more college graduates? Two key—and related—factors appear to play a role in college enrollment and completion: socioeconomic status and preparedness, broadly defined to include both academic preparation and the knowledge needed to make informed choices about college. For example, a large literature has documented the contribution of early childhood education to later academic (and labor market) success; children from lower-income families are less likely to have access to such education.¹

Children from lower-income families also are less likely to have the opportunity to attend high-quality elementary and secondary schools that enable them to make informed choices about their path after high school and succeed along that path. A challenge for policymakers, however, is that the evidence on what makes a school high quality is somewhat mixed and difficult to generalize from one school to another. This remains an important area of economic research, of interest not only to education and fiscal policymakers, but also to the Fed.

Why Does the Fed Care about Education?

All policymakers, including those at the Fed, are ultimately concerned about people’s standards of living. Improvements in standards of living are driven by economic growth, which in turn depends on productivity. Productivity depends at least in part on human capital—the skills, knowledge, and other intangible qualities that individuals possess. Formal education is a key component of human capital.

Productivity growth is of particular interest to monetary policymakers because of its relationship to the appropriate policy rate. In conventional monetary policy thinking, the central bank’s target interest rate should track an underlying interest rate known as the “natural rate of interest.” In general, the natural rate and overall economic growth move together: slower growth tends to be associated with a lower natural interest rate, and faster growth with a higher natural rate.²
Economists have identified a slowdown in productivity growth in the United States (and other developed countries) beginning in the early 2000s, which could be contributing to slower economic growth. One factor contributing to slower productivity growth might be slower growth in the United States’ stock of human capital, which could be dampening the nation’s ability to absorb technological and scientific advances. In short, low growth in college attainment may be contributing to a low natural rate of interest. The low average policy rates that would be appropriate in this situation potentially make monetary policymakers’ task more difficult by limiting the central bank’s ability to respond to recessions.

The Fed also cares about education because its mandate includes a charge to promote “maximum sustainable employment.” Aggregate employment (or unemployment) is determined by the rates at which individual workers flow through the labor market, and these flows are influenced by a variety of factors outside the purview of monetary policy. Understanding these factors gives policymakers the necessary context for taking monetary policy actions, including cognizance of those actions’ potential limitations. Education is one such factor: during economic downturns and expansions alike, college graduates on average have much lower unemployment rates than workers with less formal education. And during recessions, the unemployment rate for college graduates tends to rise less than the rate for less-educated workers. (Note the large difference in the recession of 2007–09 in Figure 1.) Thus, a well-educated workforce may offer the promise of an economy with a low and stable unemployment rate.

**Supply and Demand for High-Skill Workers**

In the first half of the twentieth century, schooling increased steadily for successive cohorts of Americans, according to research by Claudia Goldin and Lawrence Katz of Harvard University. While those born in 1920 had completed less than eleven years of schooling on average by age thirty-five, those born in 1950 completed about thirteen and a half years. However, educational attainment decelerated sharply for those born during the next twenty years, with the result

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**Figure 1: Unemployment Rate by Educational Attainment**

NOTES: “Some College” includes people who earned two-year degrees. Data are for workers age twenty-five and older through the fourth quarter of 2017. Shaded areas indicate recessions.
that Americans, particularly men, born in 1970 barely completed more years of school than those born in 1950. (See Figure 2.) Rui Castro of the University of Western Ontario and Daniele Coen-Pirani of the University of Pittsburgh have found similar results. In a 2016 article, they concluded that the college graduation rate for white men actually decreased between the 1948 and 1960 birth cohorts; despite some recovery, the graduation rate for the 1972 cohort was still 3 percentage points lower than the rate for the 1948 cohort.

This slowdown in skill acquisition, combined with growing demand for high-skill workers, contributed to a large increase in the “college premium”—the higher wages and earnings of college graduates relative to workers with only a high school degree. In 1980, workers with a bachelor’s degree or higher earned about 29 percent more than workers with only a high school degree. By 2009, college graduates earned nearly 45 percent more, a gap that has persisted since then. (See Figure 3.)

In previous periods in the United States, an increase in the demand for highly educated workers has been met with a supply response: workers, observing that a skill premium existed, increased their level of education to take advantage of it. Over time, this had the effect of reducing the wage gap. For example, the high school graduate premium plummeted by more than half between 1910 and 1950, a period during which the fraction of seventeen-year-olds who were high school graduates rose from less than 9 percent to nearly 60 percent.

Recent data do point to an increase in educational attainment for cohorts born after the 1970s. Still, the persistence of the college premium suggests that the supply of high-skill workers remains insufficient to meet the economy’s demand. Moreover, to the extent attainment has increased, it has increased unequally.

Trends in College Enrollment and Completion
College enrollment in the United States has grown substantially since the 1970s. Between 1975 and 2015, the share of eighteen- to twenty-four-year olds enrolled in a four-year institution increased from 17.3 percent to 29.9 percent, with the majority of the increase occurring
between 1975 and 1995, according to the National Center for Education Statistics (NCES). The share peaked at 30 percent in 2011 and then declined—likely as a result of declining enrollment in for-profit schools—before starting to rise again in 2014.

College enrollment varies significantly by measures of socioeconomic status. In 2010–11, 50.7 percent of graduates from public high schools where less than a quarter of the students were approved for free or reduced-price lunch programs enrolled in a four-year college the following year. In contrast, during the same time period, only 29.1 percent of high school students graduating from a school where more than three-fourths of the students were approved for free or reduced-price lunch enrolled in a four-year college. There is also variation by geography; students from rural areas are slightly less likely to attend college than students from suburban areas, and they are more likely to attend a two-year college. Students who obtain a two-year degree do earn more on average than those with only a high school degree, but the premium is much smaller than for those with a four-year degree. (See Figure 3.)

Currently, a large share of students who enroll in college fail to graduate: among students who started attending a four-year institution in 2009, only 59 percent had earned a bachelor’s degree within six years, according to the NCES. That’s a modest improvement since the 1996 cohort, the first year for which the NCES has published data, when 55 percent earned a degree within six years. (Completion rates vary greatly by type of institution: 59 percent at public colleges, 66 percent at private nonprofit colleges, and 23 percent at private for-profit colleges.)

Like college enrollment, college completion varies by socioeconomic factors. In 2002, the NCES began surveying a cohort of about 15,000 high school sophomores. Students were assigned a composite score for socioeconomic status (SES) based on their parents’ education levels, occupations, and income. Then they were grouped into low, middle, and high SES. By 2012, 77 percent of the high-SES students who were enrolled in a four-year college in 2006 had earned a bachelor’s degree or higher. But only 50 percent of the low-SES students who enrolled in college had completed their degrees by 2012. Even among students with similar
prematriculation academic achievement, low-SES students were less likely to complete college than high-SES students.\textsuperscript{12}

Recent research by Sarah Turner and Emily Cook of the University of Virginia (UVa) illustrates how these differences play out at the state level. Overall, Virginia is one of the most highly educated states in the nation. But within the state, college attendance ranges from less than 50 percent of high school graduates in some low-income, predominantly rural school districts to more than 80 percent in some high-income, suburban school districts, based on data from the 2013–14 school year.\textsuperscript{13} There also are systematic differences in the schools to which students apply and eventually enroll; in general, students from less affluent, more rural districts are less likely to apply to and to enroll in high-resource institutions, such as UVa or the College of William & Mary, than students from more affluent, suburban areas. Universities with more resources, as measured by instructional expenditures per student, tend to have higher graduation rates, and their graduates tend to have higher earnings. In part, these outcomes reflect the characteristics of the students most likely to attend high-resource schools, but they also reflect the benefits of greater resources.

**Is the Problem Paying for College?**

Given the correlations between family income, college enrollment, and college completion, not to mention widely publicized tuition increases in recent decades, one approach to reducing disparity has been to increase the availability of need-based financial aid.\textsuperscript{14} Thus, at most schools, there is a large difference between sticker price and net price, especially for students from lower-income families. And at some of the most selective (and expensive) schools, the availability of considerable need-based financial aid produces realized net costs for low- and moderate-income families that actually are lower than net costs at less selective schools. The posted price to attend UVa, for example, is nearly $27,000 per year. But for a student with a family income between $30,000 and $39,999, the average net price is about $11,000 per year. In contrast, the sticker price to attend Old Dominion University, in Norfolk, Virginia, is $21,523, while the net price for a low-income student is $15,170.\textsuperscript{15}

Many students do not seem to have full information about college costs. In a 2015 survey, Zachary Bleemer of the University of California, Berkeley and Basit Zafar of Arizona State University found that students and their families believed the annual net cost of attending a four-year college was about $10,000 higher than the actual net cost. Lower-income families and families where the parents had not attended college were more likely to overestimate costs.\textsuperscript{16}

While posted prices can make a college seem less attainable than it actually is, paying for any college may remain a burden for many families.\textsuperscript{17} Research by John Bailey Jones of the Richmond Fed and Fang Yang of Louisiana State University suggests that if college costs had stopped increasing after 1961, enrollment would have been 3 percent to 6 percent higher in 2010.\textsuperscript{18}
In addition, the returns to college are uncertain, both because of the likelihood of noncompletion and because of earnings variation even among those who do graduate. This uncertainty, combined with the costs of college, makes college a risky investment. Some students who choose not to enroll, particularly those from low-wealth households, appear to be making rational decisions because the risks to them are large enough to exceed the expected gains.19

Why do some students fail to complete college? Research suggests that the decision to drop out reflects a process of learning about one’s own ability; many students seem to lack sufficient knowledge about their academic ability when they enter college, and they drop out based on what they learn about their ability after they enroll.20

This process of self-discovery may work differently for students from different socioeconomic backgrounds, according to research by Ali Ozdagli of the Boston Fed and Nicholas Trachter of the Richmond Fed.21 In a 2015 paper, they developed a model in which students enroll in college and are endowed with a particular wealth level. Students learn about their ability to accumulate skills by taking exams; each time they take an exam, they update their beliefs about their abilities and weigh the expected gains from completing college against the costs of remaining in college. Ozdagli and Trachter demonstrate that students’ initial wealth levels affect their belief threshold for dropping out. Wealthier students are less risk-averse and thus more likely to continue investing in the risky asset, that is, to continue attending college. Poorer students are about 27 percent more likely to drop out. They also drop out about one year earlier.22

It might also be the case that children from families with fewer resources are less prepared for college in the first place. Virginia Commonwealth University economists Adam Blandin and Christopher Herrington have studied how college attainment varies among students from different family backgrounds and whose parents have different education levels. In general, they found that college completion rates have increased more for students who grew up in a two-parent household where at least one parent had a bachelor’s degree or higher. The authors attribute this difference to the fact that these “high-resource” families are able to invest more in preparing their children for college.23

Preparing Students for College
This research raises the question: Why are some students better prepared than others? Preparation includes two key components, both of which tend to vary with socioeconomic factors. One component is information, or “knowledge about college.” Numerous studies have shown that low-income students don’t know as much about the application process and tend to receive less help navigating it. In part, this could be because they know fewer adults who have completed college. It also could be because they attend high schools with fewer resources for college guidance.24
The schools children attend also affect the second major component, academic preparation. In the United States, residential neighborhoods are the predominant mechanism of assigning students to schools. The value of a neighborhood’s schools in turn affects its housing prices. This gives wealthier parents more options, as they can afford to move to neighborhoods with higher housing prices and better quality schools or opt to send their children to private schools. Recent research by Sean Reardon of Stanford University found that students in the most and least socioeconomically advantaged school districts performed an average of four grade levels apart.25

While research suggests school quality improves academic outcomes, defining “quality” is no simple task. Researchers have been attempting to do so since at least the 1960s, when Johns Hopkins University sociologist James Coleman conducted the first comprehensive survey of the U.S. educational system.26 (Coleman concluded that a school’s physical amenities were less of a factor in achievement than a student’s peers and socioeconomic background and that disadvantaged students in particular would benefit from greater diversity.)

Because there is significant variation across school districts, schools, and students themselves, it is difficult to generalize the outcomes of any specific intervention to other settings. In addition, it is very difficult to disentangle the various factors that contribute to school quality and student outcomes.

Despite these caveats, two factors consistently emerge from the research as important inputs into school quality: teacher quality and class size.27 For example, a one standard deviation increase in teacher quality has been shown to raise math achievement by 0.15 to 0.24 standard deviations per year and reading achievement by 0.15 to 0.20 standard deviations per year.28 But what makes a teacher effective? One determinant is experience—teachers who have been in the classroom at least three years tend to do better than those with less experience.29 But beyond this fact, the answer remains somewhat elusive. This is an open area of research, and the findings will be important for designing policies that effectively incentivize better teaching.30

Switching to a small class can raise a student’s test scores by about 0.15 standard deviations, according to studies of Project STAR, a class-size reduction initiative in Tennessee. The gains were the largest for lower-income and minority students. But while reducing class size, particularly for kindergarten through third grade, may have significant effects on students’ academic performance, smaller classes are costly. In addition, to the extent class-size reduction requires schools to hire inexperienced or less-effective teachers, the benefits could be muted.

**School Choice**

School choice programs, such as private school vouchers, charter schools, and open enrollment, attempt to break the link between families’ socioeconomic status and their access to quality schools. Proponents of

*Switching to a small class can raise a student’s test scores by about 0.15 standard deviations, according to studies of Project STAR.*
expanding school choice also argue that offering more alternatives to traditional public schools will introduce competition in an otherwise noncompetitive public school sector and make public schools more productive. A potential downside of such programs is that they reduce academic diversity in the classroom, which may be particularly detrimental for lower-achieving students. In addition, low-performing schools (and the students who remain in them) may be left even worse off because school funding is typically tied to school size.

Currently, twelve states and Washington, D.C., offer voucher programs, including Maryland and North Carolina. (Some states also offer education savings plans or scholarship tax credits to help children attend private schools.) Some studies have found positive effects for certain groups of students in certain subjects, but the results are inconsistent. Several recent studies actually found that test scores declined for children using vouchers to attend private schools. This might reflect the fact that private schools with declining enrollment, perhaps because of lesser academic quality, are more likely to participate in voucher programs.

There seems to be more evidence in favor of charter schools, which receive public funding but are independently operated under a charter with the school district. Charter schools have become widespread since the early 2000s. Currently, at least forty-two states and D.C. have passed legislation allowing charter schools, including every state in the Fifth District. From the 2004–05 school year through the 2014–15 school year, the percentage of all public schools that were public charter schools increased from 4 percent to 7 percent, and the number of students enrolled in public charter schools increased from about 900,000 to 2.7 million, according to the NCES.

Numerous studies have shown improvements in standardized test scores for students attending charter schools, with the largest gains accruing to students from disadvantaged backgrounds. Some research also has found that students attending charter schools are more likely to graduate from high school and attend college. Because charter schools vary widely in their instructional approaches, however, any positive results might only be applicable to the particular schools studied.

Another mechanism for increasing school choice is open enrollment, where students have the option to transfer to another school within their district or even to a school outside their district. Most states allow open enrollment in some form, albeit with a number of restrictions based on a school’s capacity and which students receive priority.

In the Fifth District, the Charlotte-Mecklenburg school district offered open enrollment for the 2002–03 school year after a court ruling ended a decades-old busing program. One study found that students who used the choice program to attend a school with higher test scores had significant gains in academic achievement. Another study found that girls who attended a higher-quality school were much more likely to graduate from high school and attend college, although for boys on average there was little effect.

A universal difficulty in assessing school-choice programs is controlling for selection effects. For example, the gains in academic achievement observed in Charlotte might have occurred because more academically focused or motivated students (or those with more academically focused parents) chose to take advantage of the opportunity to attend a different school.
Beyond College

This essay has focused on college completion rates as a factor restricting the supply of college graduates in the United States, including how students’ preparation during K-12 affects their chances of earning a degree. It is possible, however, that improvements in preparation could lead to higher college completion rates without increasing the number of graduates: to the extent “knowledge about college” is part of being prepared, students on the margin of dropping out of college might decide not to enroll in the first place.

In fact, a high school that focuses predominantly on college preparation might not be a good match for everyone. If the only reason to graduate from high school is to enroll in college, then students who do not wish to attend college or who perceive large barriers to doing so might not see much value in graduating. For those students, information about and access to vocational training or apprenticeship programs, for example, could increase the value of finishing high school and improve their labor market outcomes relative to dropping out.40

In addition, while most studies of school quality focus on academic gains, these are not the only reasons to try to improve schools. Efforts to improve school quality also may improve students’ noncognitive skills and thus affect labor market outcomes through those channels. For example, one study of Project STAR found that class quality (as measured by students’ end-of-year test scores) in kindergarten through third grade had significant effects on skills such as effort, initiative, and lack of disruptive behavior in later grades.41 These skills, in turn, are highly correlated with earnings later in life even after conditioning on test scores. These results suggest that high-quality classrooms may lead to improved labor market outcomes long after their effects on test scores have dissipated. ■

Urvi Neelakantan is a senior policy economist and Jessie Romero is a senior economics writer in the Research Department at the Federal Reserve Bank of Richmond. The authors are grateful to John Bailey Jones, Karl Rhodes, Nicholas Trachter, and John A. Weinberg for many helpful comments.

The views expressed are those of the authors and not necessarily those of the Federal Reserve Bank of Richmond or the Federal Reserve System.
For an overview, see Duncan and Magnuson (2013).

For more on the natural rate, see Lubik and Matthes (2015).

Hornstein, Krusell, and Violante (2007).


Castro and Coen-Pirani (2016).

Increasing demand and higher wages for high-skill workers is generally attributed to “skill-biased technical change,” or changes in technology that increase the productivity of workers with the education to use the new technologies. For more, see Goldin and Katz (2010) and Jones and Yang (2016). There is some debate, however, about whether the value of a college degree stems from the knowledge gained during college or from the “signal” sent by obtaining a degree (Caplan 2018). Also, Schwartzman (forthcoming) illustrates how spillovers among skilled workers may contribute to higher wages for those workers.

Some economists are now asking why the premium has not continued to increase. Some research suggests the demand for high-cognitive workers has actually decreased since 2000, leading college-educated workers to move down the occupational ladder and perform jobs typically held by less-skilled workers (Beaudry, Green, and Sand 2016). Other research finds that technological change has polarized the labor market and led to a decline in middle-skill jobs (Acemoglu and Autor 2011; Autor and Dorn 2013). Valletta (2017) finds evidence of both “de-skilling” and polarization.


It’s also possible that the greater availability of financial aid has enabled colleges to raise tuition more than they otherwise would have.


Bleemer and Zafar (2018).

The evidence on whether financial factors restrict college attendance is mixed. See Lochner and Monge-Naranjo (2012).

Jones and Yang (2016).

Athreya and Eberly (2016); Hendricks and Leukhina (forthcoming).

Stinebrickner and Stinebrickner (2008) and (2012).


In related research, Trachter (2015) finds that community colleges are a relatively inexpensive way for students to learn about their ability before potentially transferring to a four-year college.


Hoxby and Avery (2013).

Beardon (2016).

Coleman (1966).


See Fryer (2013).


See Neal (2011) for a discussion of teacher incentives.

For an overview of the literature on peer effects, see Sacerdote (2011).

Vermont and Maine also have voucher programs, but these are long-standing policies for students who live in towns without a public school.

For example, see Figlio and Karbownik (2016).

See Hoxby and Rockoff (2005); Gronberg and Jansen (2001); Abdulkadiroğlu et al. (2011); and Booker et al. (2011).


The No Child Left Behind Act of 2001 mandated that students can transfer out of schools that fail to make “adequate yearly progress” two years in a row. For an overview of open-enrollment policies, visit the Education Commission of the States at www.ecs.org/open-enrollment-policies.

CMS serves roughly 150,000 students in North Carolina and is the eighteenth-largest school district in the country.


Deming et al. (2014).

Cullen, Levitt, Robertson, and Sadoff (2013).

Chetty et al. (2011).


Reardon, Sean F. April 2016. “School District Socioeconomic Status, Race, and Academic Achievement.” Manuscript.


Economic activity in the Fifth Federal Reserve District expanded moderately in 2017, according to anecdotal reports and economic data compiled by the Richmond Fed. Labor markets strengthened as payrolls expanded and wage growth picked up. In fact, compared with 2016, more firms reported raising starting wages, offering sign-on bonuses, or expanding benefits packages to attract qualified workers. Fifth District manufacturers and services firms generally reported solid growth in 2017. Hurricanes Harvey and Irma hurt some businesses, but the effects were largely temporary. Real estate markets continued to improve as home prices rose and residential and commercial construction activity expanded, although builders struggled to find enough buildable lots and construction labor to meet growing demand, so inventories of homes for sale declined in many markets.

Labor Markets
Labor market conditions generally improved during the year. By December 2017, payroll employment in the Fifth District had grown 0.9 percent since the end of 2016, somewhat less than the national rate of 1.5 percent. The only two Fifth District jurisdictions to outpace national growth were South Carolina and North Carolina, where employment expanded 1.6 percent in each state. Maryland reported the slowest year-over-year growth in the District at just 0.1 percent, while employment growth in the District of Columbia (D.C.), Virginia, and West Virginia ranged from 0.5 percent to 1 percent.

In the Fifth District as a whole, the professional and business services industry led employment growth in absolute terms (37,900 jobs), while the natural resources, mining, and construction industry reported the largest percentage growth of 2.4 percent by adding 17,900 jobs. Overall job growth was constrained, however, by slow growth in the District’s two largest sectors—government and trade, transportation, and utilities—which grew 0.1 percent and 0.4 percent, respectively, and by a 0.2 percent decline in the District’s smallest sector, information.

Meanwhile, the unemployment rate in the Fifth District ended the year at 4.2 percent, which was just slightly above the national rate of 4.1 percent. In 2017, the District unemployment rate reached its lowest mark since October 2007. Since last December, jobless rates declined in every jurisdiction, with the largest improvements occurring in North Carolina and Virginia, where each rate declined 0.5 percentage points. Virginia continued to report the lowest unemployment rate in the District at just 3.6 percent in December 2017.

Anecdotes from across the Fifth District also indicated a tightening labor market in 2017 as many employers reported difficulty filling open positions. Some of the most often cited shortages were for engineers, accountants, information technology specialists, construction workers,
and truck drivers. In a survey conducted by the Richmond Fed in November 2017, employers were asked which approaches they took to find workers. The most selected answer was retaining and promoting existing employees to reduce the need for new hires, followed by increasing the wages, signing bonuses, or benefits offered to new hires. Other popular approaches were to hire less-qualified applicants and train them or to use a temporary staffing agency.

Moreover, when asked about the use of starting wages to attract new hires, nearly 74 percent of responding firms in November said they had raised starting wages for some or most job categories. By comparison, when the same survey was conducted two years ago, less than 50 percent of respondents reported raising starting wages. Existing employees were also more likely to see wages increase more than in previous years, according to the survey results.

The most recent data from the Bureau of Labor Statistics’ Quarterly Census of Employment and Wages reinforced the anecdotal evidence. The average wage across industries in the District during the four quarters ending in September 2017 was up 2.2 percent from the same period in 2016. Employees in the construction industry saw the largest average wage growth of 4.1 percent, followed by those engaged in financial services, where the average wage rose 3.5 percent. The average wage in the professional and business services industry grew 2.5 percent from the fall of 2016 to the fall of 2017.

**Business Conditions**

Manufacturing activity strengthened in 2017 and had its strongest year since 2010 by some metrics. The Richmond Fed maintains a composite manufacturing index based on its 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 composite index spent all of 2017 above zero, ranging from three to thirty. The reading of thirty was the highest on record, and the last time the index reached a value greater than twenty-five was in April 2010.
Anecdotal reports from manufacturers were also generally positive throughout the year. Some of the most consistently positive accounts came from manufacturers of metals, computer and electrical components, plastics, rubber, and corrugated packaging and pulp. Food manufacturers reported solid growth but faced narrow profit margins. Several manufacturers cited increased production coming as a result of investment in new equipment. However, despite consistently positive index readings for employment from the Bank’s survey, many expressed challenges finding and retaining skilled labor.

In August and September, Hurricanes Harvey and Irma had some direct and indirect effects on District manufacturers, most of which were negative. The most noted impacts were supply chain disruptions and increased prices for items such as gas, freight, lumber, and plastic resin. There were also some reports of plant and mill shutdowns, delayed delivery times and lagged payments, and decreased sales in affected locations. On the other hand, a few manufacturers saw sales and production increase as new orders were diverted to them from plants that were directly hit by the storms.

Services firms consistently reported expanding business activity in 2017, according to the Bank’s services sector survey, in which the revenues index for the sector remained above zero all year, ranging from ten to thirty. Anecdotally, some of the strongest growth was reported by transportation and hospitality services. For example, ports in Maryland and South Carolina reported record levels of cargo units shipped, while many hotels and restaurants across the District benefited from robust tourist activity.

The retail industry also strengthened in 2017, according to both anecdotes and the Richmond Fed survey, in which the index for revenues remained well above zero all year. Despite reports of intensifying competition from online retailers, many brick-and-mortar establishments experienced growth in sales, particularly for big-ticket items such as furniture, appliances, and recreation and outdoor equipment.

The survey indexes for employment in the manufacturing and services sectors were mostly consistent with the labor market data. The manufacturing index for employment
started the year off at a value of six and rose over the course of the year to end at a reading of twenty. Manufacturers generally said that strengthening demand for their products drove the need to hire. However, many also noted difficulty finding workers with the requisite skills, a problem that put upward pressure on starting wages. These reports were supported by the survey measure of manufacturing wages, which steadily rose during the year.

Likewise, the services sector measure of employment averaged seventeen during the year, which was up from an average of thirteen in 2016. In the nonretail subsector, the employment index was consistently elevated at values typically between fifteen and twenty. Meanwhile, the same index in the retail subsector, which also held above zero all year, peaked at forty in July, which was the highest reading in the survey’s twenty-five-year history. As in the manufacturing industry, the index for wages in the overall services sector trended higher in 2017, averaging twenty-four (up from twenty in 2016).

Fewer services firms were affected by the hurricanes than manufacturers, but almost all of the reported effects were negative. The most common impact was a decline in sales in the affected regions. Additionally, some services firms noted that the storms caused transportation and warehousing disruptions and delayed deliveries from suppliers.

**Real Estate**

Fifth District housing markets improved in 2017. House prices, according to CoreLogic Information Solutions, grew 4.2 percent from the previous year, which lagged the national annual growth rate of 6.6 percent. House prices in North Carolina and South Carolina rose the fastest (5.5 percent and 5.3 percent, respectively), while prices in D.C. grew the slowest (2.5 percent). Contacts also noted low inventory levels and said that desirable properties were selling quickly.

Residential construction expanded, on the whole, despite growing constraints in the availability of buildable lots, rising materials costs, and challenges finding construction workers. In several cases, the constraints drove up prices for new homes at a faster rate than for existing homes. Although multifamily construction started to slow in many markets, some areas continued to report expansion in multifamily compared with 2016. Fifth District jurisdictions issued a combined 154,511 residential building permits in 2017, which was an increase of 11.3 percent from the prior year. Single-family permits grew 12.4 percent, while multifamily permits grew 8.9 percent. Total housing starts grew slightly slower than total permits, increasing 8.7 percent in 2017.
Commercial real estate activity also expanded in 2017, particularly for industrial development and for warehousing and distribution centers. There were also some reports of strong demand for more health care space. In some markets, the demand for retail construction picked up, particularly for smaller spaces and in mixed-use developments. Office and retail leasing generally rose, and average rents reportedly moved higher.

**Banking Conditions**

Bank consolidation continued in 2017, and Fifth District banking conditions improved overall. However, net interest margins remained compressed, some banks utilized increasingly higher levels of volatile funding sources to support loan growth, and small pockets of credit-quality problems began to develop.

District banks’ earnings improved in 2017, though earnings challenges remained. The District’s median return on average assets of 0.78 percent, as of the third quarter, reached its highest level since 2007, but the District median stayed below the national median of 0.98 percent. Earnings improvements were primarily the result of lower overhead expenses with about two-thirds of District banks improving their efficiency ratios. However, small District banks continued to be less efficient compared with larger institutions, a fact that may be fueling industry consolidation. While interest rates increased over the year, District banks’ net interest margins remained flat. In addition, banks’ fourth-quarter earnings across the nation were negatively impacted by corporate tax reform. Bankers expect to benefit from the lower corporate tax rate over the long term, but the new law required many institutions to recognize one-time write-downs to their deferred tax assets in the fourth quarter.

Loan growth was solid and supported by increasing capital ratios on average. District banks’ balance sheets expanded at a median pace of 6.1 percent, slightly above the national year-over-year median growth rate of 5.8 percent. Although slower than the prior year, loan growth remained strong across all lending categories, particularly in the commercial real estate (CRE) sector. In addition, some District banks continued to maintain relatively heavy reliance on potentially volatile funding sources, which may include brokered deposits, uninsured deposits, and listing service deposits. While, on average, noncore funding levels have trended downward since the financial crisis, District levels continued to be higher than national levels.

Nonperforming loans and net losses remained low; however, credit-quality indicators deteriorated slightly in a few specific areas, such as the consumer category at large banks and in CRE portfolios at some small and midsize banks. On average, District banks’ loan loss provisions declined slightly as a percent of total expenses from a year ago.

**Conclusion**

On balance, the Fifth District economy expanded in 2017 and outpaced growth in 2016 by many metrics. Employment increased during the course of the year, and tighter labor market conditions put more pressure on firms to raise starting wages or expand benefits. Residential and commercial real estate activity picked up in 2017, although builders faced headwinds of a shortage of available lots and difficulty finding workers. In general, businesses across the District reported growing optimism throughout 2017 that extended into a positive outlook for growth in 2018. ■
The Richmond Fed Operates Around the Clock

As one of twelve Reserve Banks in the Federal Reserve System, the Richmond Fed performs several key functions. It contributes to the formulation of monetary policy. It supervises and regulates banks as well as bank and savings and loan holding companies that are headquartered in the Fifth Federal Reserve District. And it processes currency and electronic payments for depository institutions and acts as a fiscal agent for the federal government. In addition, the Richmond Fed works with a variety of partners to strengthen communities throughout the Fifth District. Given the importance of these public-service responsibilities, the Bank operates around the clock every day.

As an examiner of large financial institutions, Jadrian Jones travels to conduct onsite examinations. Bank supervision is a key function of the Richmond Fed.

At a pre-FOMC meeting, research economists listen intently to a discussion of inflation dynamics led by senior economist Felipe Schwartzman.

Assistant cash manager Neesha Livingston moves twenty-dollar bills toward the currency-processing equipment in the Bank’s Richmond office. Processing cash is a critical service to banks and the public.
Conducting Monetary Policy
The Federal Open Market Committee (FOMC) conducts monetary policy—primarily by setting and influencing interest rates—to promote stable prices, maximum employment, and moderate long-term interest rates.

The Richmond Fed’s Research Department helps prepare the Bank’s president for monetary policy deliberations at FOMC meetings, advises him on banking- and financial-regulatory policy, and helps him develop views on economic issues of relevance to residents in the Fifth District. The department also seeks to be the premier source of economic information and analysis to District stakeholders. These functions require that the department’s economists remain at the frontier of scholarly research, that the department’s economics writers convey key concepts through publications for the general public, and that the department’s economic educators create engaging content for students. The department’s functions also require extensive regional outreach—with surveys, business roundtables, advisory groups, and the Bank’s directors—to better understand business and economic conditions in the Fifth District and the nation.

Supervising and Regulating Banks
Another primary function of the Richmond Fed is to supervise and regulate banks as well as bank and savings and loan holding companies headquartered in the Fifth District. Working together with agencies at the state level and with the comptroller of the currency and the Federal Deposit Insurance Corporation at the national level, Reserve Banks help to promote confidence in the U.S. banking system.

At the Richmond Fed, staff members determine the soundness of institutions’ assets by conducting regular examinations and inspections to evaluate the effectiveness of policies, management, operations, and risk-management practices. Examiners also assess compliance with banking laws and regulations and sensitivity to various risks, including risks related to the quality and reliability of institutions’ computer systems and networks.
Processing Cash and Electronic Payments
Reserve Banks often are described as “bankers’ banks.” In other words, they provide services to depository institutions that are similar to the services that depository institutions provide to their customers.

For example, when people in the Fifth District demand more currency from the banking system, depository institutions withdraw cash from their accounts at the Richmond Fed. Conversely, when people in the Fifth District demand less currency from the banking system, depository institutions deposit surplus cash in their accounts at the Richmond Fed.

The Bank also helps facilitate electronic payments, including funds transfers (via Fedwire) and the automated clearinghouse (ACH). Fedwire typically conveys large-value, time-critical payments, while the ACH allows depository institutions to send electronic credits and debits to each other. The direct deposit of paychecks, Social Security benefits, and tax refunds are typical examples of ACH credits. The direct payment of mortgage installments and utility bills are common examples of ACH debits.

Strengthening Communities
The Richmond Fed’s Community Development Group works with local partners to identify and address economic challenges and opportunities in low- and moderate-income communities in the Fifth District. In doing so, the group focuses on people, places, small businesses, and policies and practices.

The focus on people includes identifying and promoting best practices in workforce development and financial education. The small business focus supports such firms in the Fifth District by gathering and analyzing data related to small businesses’ access to technical and financial resources. The focus on places includes studying and advancing comprehensive community development efforts that are geographically specific, while the policy and practice focus looks for ways to advance the field of community development more
generally. For example, the department assists banks in implementing the Community Reinvestment Act, which requires depository institutions to help meet the credit needs of their communities, including low- and moderate-income neighborhoods.

**Supporting the Bank’s Operations**

To support the key functions outlined above, many Richmond Fed staff members provide a variety of services that are necessary for any large organization to function efficiently and effectively. Examples include accounting, auditing, client services, corporate communications, corporate planning, facilities management, health services, human resources, information management, law enforcement, legal services, risk mitigation, statistical analysis, and technological solutions.

In addition to these supporting roles, the Richmond Fed hosts and provides leadership for four support functions throughout the Federal Reserve System: National IT, the Currency Technology Office, the National Procurement Office, and Centralized Payroll Operations.

As their names imply, Centralized Payroll Operations provides payroll services to all twelve Reserve Banks’ employees, while the National Procurement Office leverages the combined purchasing power of the Reserve Banks. The Currency Technology Office is responsible for supplying the processing equipment, software, and authentication sensors to all Reserve Banks to ensure confidence in the use of U.S. currency globally.

The Bank’s largest system-wide support function is performed by National IT, which provides enterprise information technology architecture and standards, enterprise information security policy and assurance, computing and network operations, project services, and end-user services to all Reserve Banks and their national product and support offices. National IT also provides services to the Board of Governors of the Federal Reserve System and the U.S. Treasury.
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 twelve 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-income 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.

THANK YOU
Thank you to the directors who completed their service in 2017: Calvin G. Butler Jr. of the Richmond Board and Claude Z. Demby of the Charlotte Board.

In 2017, the Bank welcomed Laura C. Meagher to the Charlotte Board.

Lists of boards and councils on the following pages include members, titles, and affiliations as of December 31, 2017.
Board of Directors—Federal Reserve Bank of Richmond

CHAIR
Margaret G. Lewis
Retired President
HCA Capital Division
Richmond, Virginia

DEPUTY CHAIR
Kathy J. Warden
Corporate Vice President and President,
Mission Systems
Northrop Grumman Corporation
Linthicum, Maryland

Calvin G. Butler Jr.
Chief Executive Officer
Baltimore Gas and Electric Company
Baltimore, Maryland

Ángel Cabrera
President
George Mason University
Fairfax, Virginia

Robert R. Hill Jr.
Chief Executive Officer
South State Corporation
Columbia, South Carolina

William A. Loving Jr.
President and Chief Executive Officer
Pendleton Community Bank
Franklin, West Virginia

Catherine A. Meloy
President and Chief Executive Officer
Goodwill of Greater Washington and Goodwill Excel Center
Washington, D.C.

Thomas C. Nelson
Chairman, President, and Chief Executive Officer
National Gypsum Company
Charlotte, North Carolina

Susan K. Still
President and Chief Executive Officer
HomeTown Bankshares Corporation and HomeTown Bank
Roanoke, Virginia

FEDERAL ADVISORY COUNCIL REPRESENTATIVE
Brian T. Moynihan
Chairman and Chief Executive Officer
Bank of America
Charlotte, North Carolina

Board of Directors—Baltimore Branch

**CHAIR**

**Susan J. Ganz**  
Chief Executive Officer  
Lion Brothers Company, Inc.  
Owings Mills, Maryland

**Kenneth R. Banks**  
President and  
Chief Executive Officer  
Banks Contracting Company  
Greenbelt, Maryland

**Christopher J. Estes**  
Consultant on Business Development and Advocacy  
Rebuilding Together of Washington, D.C.

**Wayne A. I. Frederick**  
President  
Howard University  
Washington, D.C.

**Laura L. Gamble**  
Regional President  
Greater Maryland  
PNC  
Baltimore, Maryland

**Mary Ann Scully**  
Chairman, President, and  
Chief Executive Officer  
Howard Bancorp  
Elicott City, Maryland

**Austin J. Slater Jr.**  
President and  
Chief Executive Officer  
Southern Maryland Electric Cooperative, Inc.  
Hughesville, Maryland

*From the left, front row: Kenneth R. Banks and Susan J. Ganz; middle row: Mary Ann Scully, Austin J. Slater Jr., and Wayne A. I. Frederick; back row: Christopher J. Estes and Laura L. Gamble*
Board of Directors—Charlotte Branch

CHAIR
Laura Y. Clark
Chief Impact Officer
United Way of Central Carolinas
Charlotte, North Carolina

Michael C. Crapps
President and
Chief Executive Officer
First Community Bank
Lexington, South Carolina

Claude Z. Demby
Vice President and
General Manager
Cree, Inc.
Durham, North Carolina

Michelle A. Mapp
Chief Executive Officer
South Carolina Community Loan Fund
Charleston, South Carolina

Jerry L. Ocheltree
President and
Chief Executive Officer
Carolina Trust Bank
Lincolnton, North Carolina

R. Glenn Sherrill Jr.
President and
Chief Executive Officer
SteelFab, Inc.
Charlotte, North Carolina

From the left, front row: Laura Y. Clark and Claude Z. Demby;
middle row: Michelle A. Mapp, Michael D. Garcia, and R. Glenn Sherrill Jr.;
back row: Michael C. Crapps and Jerry L. Ocheltree
Community Depository Institutions Advisory Council

CHAIR

Robert A. DeAlmeida*
President and
Chief Executive Officer
Hamilton Bank
Towson, Maryland

Suzanne S. DeFerie
President and
Chief Executive Officer
Asheville Savings Bank
Asheville, North Carolina

Mark D. Harrell
President and
Chief Executive Officer
CNB Bank
Berkeley Springs, West Virginia

James L. King
President and
Chief Executive Officer
The Bank of Monroe
Union, West Virginia

T. Gaylon Layfield III
Chief Executive Officer
Xenith Bank
Richmond, Virginia

Theresa B. Mann
President and
Chief Executive Officer
The Partnership Federal
Credit Union
Arlington, Virginia

Gary R. Mills
President and
Chief Executive Officer
First Community Bank
Bluefield, Virginia

David L. Morrow
President and
Chief Executive Officer
CresCom Bank
Charleston, South Carolina

Ronald D. Paul
Chairman and
Chief Executive Officer
EagleBank
Bethesda, Maryland

R. Arthur Seaver Jr.
Chief Executive Officer
Southern First Bank
Greenville, South Carolina

Judy R. Tharp
President and
Chief Executive Officer
Piedmont Advantage
Credit Union
Winston-Salem, North Carolina

Michael O. Walker
Retired President and
Chief Executive Officer
Benchmark Community Bank
Kenbridge, Virginia

*In 2017, Robert A. DeAlmeida served as the Fifth District’s representative on the Community Depository Institutions Advisory Council at the Board of Governors of the Federal Reserve System.

List includes members, titles, and affiliations as of December 31, 2017.

Community Investment Council

CHAIR

Mary M. Hunt
Program Director, Community and Economic Development
The Claude Worthington Benedum Foundation
Pittsburgh, Pennsylvania

Oswaldo Acosta
Director of Small Business Services
Latino Economic Development Center
Washington, D.C.

Michael D. Atkinson
Senior Vice President, Manager of Community Development
First Citizens Bank and Trust Company
Raleigh, North Carolina

David Dodson
President
MDC
Durham, North Carolina

Vince Ford
Chief Community Health Services Officer
Palmetto Health
Columbia, South Carolina

Tamea L. Franco
President and Chief Executive Officer
Global Metal Finishing, Inc.
Roanoke, Virginia

Earl F. Gohl
Federal Co-Chair
Appalachian Regional Commission
Washington, D.C.

Thomasina Hiers
Director, Baltimore Civic Site
The Annie E. Casey Foundation
Baltimore, Maryland

Jody Keenan
State Director
Virginia Small Business Development Center
Fairfax, Virginia

John Maneval
Deputy Director, Multifamily Housing and Business Lending
Maryland Department of Housing and Community Development
Lanham, Maryland

Deborah McKetty
President and Chief Executive Officer
CommunityWorks Carolina
Greenville, South Carolina

Paul Phillips
President and Chief Executive Officer
Freedom First Federal Credit Union
Roanoke, Virginia

List includes members, titles, and affiliations as of December 31, 2017.
### Payments Advisory Council

**CHAIR**

**E. Stephen Lilly**  
Executive Vice President and Chief Operating Officer  
First Community Bancshares, Inc. and First Community Bank  
Bluefield, Virginia

**Todd Bogdan**  
Chief Operating Officer  
NewDominion Bank  
Charlotte, North Carolina

**Tim Boike**  
Senior Vice President  
Wells Fargo and Company  
Minneapolis, Minnesota

**Karen Buck**  
Executive Vice President, Commercial and Payment Operations  
TD Bank  
Mount Laurel, New Jersey

**Kim Bunn**  
Senior Vice President and Operations Executive  
Bank of America  
Jacksonville, Florida

**Richard Chin**  
Senior Vice President and Treasurer  
Pentagon Federal Credit Union  
Alexandria, Virginia

**John Kevin Cranford**  
Senior Vice President  
BB&T Corporation  
Charlotte, North Carolina

**Robert E. Dael**  
President and Chief Executive Officer  
MACHA—The Mid-Atlantic Payments Association  
Hanover, Maryland

**Jeff W. Dick**  
Chairman and Chief Executive Officer  
MainStreet Bank  
Fairfax, Virginia

**Kathy Dye**  
Vice President, Information Technology  
West Virginia Central Credit Union  
Parkersburg, West Virginia

**Margo D. Foust**  
Senior Vice President, Operations and Process Improvement  
American National Bank and Trust Company  
Danville, Virginia

**Terry Garner**  
Senior Vice President, Deposit Operations  
Southern First Bank  
Greenville, South Carolina

**Martha J. Haymaker**  
President and Chief Executive Officer  
Calhoun Banks  
Grantville, West Virginia

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

**Adrian S. Johnson**  
Senior Vice President and Chief Financial Officer  
MECU of Baltimore, Inc.  
Baltimore, Maryland

**Alison Lyewski**  
Senior Vice President, EIS Transaction Operations  
SunTrust Bank  
Orlando, Florida

**Rebecca McClain**  
Senior Vice President and Director of Operations  
Paragon Bank  
Raleigh, North Carolina

**Avery Miller**  
Director of Enterprise Payments  
Capital One Bank  
Richmond, Virginia

**Tracy J. Nelms**  
Executive Vice President, Bank Operations/Electronic Banking  
TowneBank  
Suffolk, Virginia

**Holly Pingatore**  
Senior Vice President and Director of Deposit Operations  
South State Bank  
Charleston, South Carolina

**Rick Rhoads**  
Senior Vice President, E-Services  
State Employees’ Credit Union  
Raleigh, North Carolina

**Susan G. Riel**  
Senior Executive Vice President and Chief Operating Officer  
EagleBank  
Bethesda, Maryland

**D.J. Seeterlin**  
Chief Information Officer  
Chesapeake Bank  
Kilmarnock, Virginia

**Woody Shuler**  
Vice President, Finance  
SRP Federal Credit Union  
North Augusta, South Carolina

**Laura Steele**  
President and Chief Executive Officer  
ePayResources  
Dallas, Texas

**Steve Stone**  
Executive Vice President  
United Bank  
Charleston, West Virginia

**Eric Tichenor**  
Senior Vice President and Chief Financial Officer  
MVB Bank  
Fairmont, West Virginia

**Chris Tolomeo**  
Senior Vice President, Banking Services  
M&T Bank  
Amherst, New York

**Paul Trozzo**  
Senior Vice President  
PNC Bank  
Pittsburgh, Pennsylvania

**David Willis**  
Senior Vice President, Debit Card and Funds Services  
Navy Federal Credit Union  
Vienna, Virginia

**Scott P. Young**  
Director of Payments and Card Services  
Bank-Fund Staff Federal Credit Union  
Washington, D.C.

**Gayle Youngblood**  
Assistant Vice President, Product Management  
State Employees Credit Union of Maryland  
Linthicum, Maryland

List includes members, titles, and affiliations as of December 31, 2017.
Management Committee

Mark L. Mullinix  
Interim President and Chief  
Operating Officer  

Kartik B. Athreya  
Executive Vice President and  
Director of Research  

Becky C. Bareford  
Senior Vice President, OMWI  
Director, Human Resources, and  
Corporate Accounting  

David E. Beck  
Senior Vice President and  
Baltimore Regional Executive  

Roland Costa  
Senior Vice President,  
NextGen Program  

Goutam R. Gandhi  
Senior Vice President and  
Chief Information Officer  

Michelle H. Gluck  
Executive Vice President,  
General Counsel, and  
Chief Risk Officer  

Matthew A. Martin  
Senior Vice President and  
Charlotte Regional Executive  

Michael D. Stough  
Senior Vice President and  
General Auditor  

Lisa A. White  
Executive Vice President,  
Supervision, Regulation, and  
Credit  

List includes members of the  
management committee and  
titles as of December 31, 2017.

From the left, front row: Michelle H. Gluck, Mark L. Mullinix, and  
Kartik B. Athreya; middle row: Becky C. Bareford, David E. Beck,  
Goutam R. Gandhi, and Lisa A. White; back row: Roland Costa,  
Michael D. Stough, and Matthew A. Martin
Bank Officers and Senior Professionals

Eliana Balla
Financial Economist—Senior Manager

Steven T. Bareford
Assistant Vice President

Ronald G. Barnes
Assistant Vice President

Jeremy B. Caldwell
Vice President

Niranjan Chandramowli
Vice President

Christy R. Cleare
Vice President

Kerri A. Coard
Assistant Vice President

Cary B. Crabtree
Assistant Vice President

Jeffrey B. Deibel
Assistant Vice President

Todd E. Dixon
Vice President

Adam M. Drimer
Assistant Vice President

Craig S. Edwards
Large Bank Principal Examiner

Huberto M. Ennis
Group Vice President

Gregory J. Ewald
Vice President and Deputy General Counsel

Kevin W. Fergusson
Vice President and Medical Director

Craig W. Frascati
Large Bank Principal Examiner

Gina E. Friese
Assistant Vice President

Kimberley D. Fuller
Assistant Vice President

Joan T. Garton
Vice President

Jeffrey R. Gerlach
Vice President

Richard B. Gilbert
Vice President

Rebecca Goldberg
Vice President

Keith R.G. Goodwin
Assistant General Counsel

William H. Gregg
Assistant Vice President

Borys M. Grochulski
Senior Economist

Jennifer J. Hall
Assistant General Counsel

Donovan O. Harper II
Senior Vice President

Chad K. Harper
Vice President

Mattison W. Harris
Vice President

Ann S. Harrison
Assistant Vice President

James R. Hart
Assistant Vice President

Robert L. Hetzel
Senior Economist and Research Advisor

Charles A. Hodges
CTO Senior Professional

Andreas L. Hornstein
Senior Advisor

Kathleen R. Houghtaling
Vice President and Chief Diversity Officer

Cathy I. Howdyshev
Vice President

Lawrence S. Hull
CTO Senior Professional

Gregory A. Johnson
Vice President and Assistant General Auditor

John Bailey Jones
Senior Economist and Research Advisor

Pinkaj R. Klokkenga
Assistant Vice President

Diane R. Knapp
Assistant Vice President

D. Keith Larkin
Assistant Vice President

Thomas A. Lubik
Senior Advisor

Ann B. Macheras
Group Vice President

D. Keith Maglinger
Assistant Vice President

Jody B. Martin
Assistant Vice President

Jonathan P. Martin
Assistant Vice President

Christian Matthes
Senior Economist

Laura H. Mayer
Assistant Vice President

Andrew S. McAllister
Vice President

Diane H. McDorman
Vice President

Cheryl R. Moore
Vice President

Johnnie E. Moore
Assistant Vice President

Christopher W. Murphy
Assistant Vice President

Urvi Neelakantan
Senior Policy Economist

Lisa T. Oliva
Group Vice President

Kerri R. O’Rourke-Robinson
Vice President

Dennis H. Ott Jr.
Assistant Vice President

Raymond E. Owens III
Senior Economist and Policy Advisor

Christopher J. Palumbo
Assistant Vice President

Hemangini R. Parekh
Large Bank Principal Examiner

Christin L. Patel
Assistant Vice President and Corporate Secretary

Patricia A. Perry
Assistant Vice President

Santiago M. Pinto
Senior Policy Economist

Stanley F. Poszywak
Large Bank Principal Examiner

William O. Riley
Senior Vice President

William C. Robinson
Assistant Vice President

Melanie M. Rose
Assistant Vice President

Todd M. Ryan
Large Bank Principal Examiner

Steven D. Sanderford
Large Bank Principal Examiner

Pierre-Daniel G. Sarte
Senior Advisor

Jason C. Schemmel
Assistant Vice President

Karen J. Schettino
Vice President

Felipe F. Schwartzman
Senior Economist

Michael J. Seifert
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Assistant Vice President

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Senior Economist

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James Trotta
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John R. Walter
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Meghan F. Wlaz
Assistant Vice President

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Vice President

Terry J. Wright
Group Vice President

H. Julie Yoo
Vice President

List includes officers, senior professionals, and titles as of December 31, 2017.
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Chief Administrative Officer

Devon A. Bryan  
Executive Vice President and  
Chief Information Security Officer

Scott C. Furman  
Senior Vice President for  
Organizational Effectiveness

Ghada M. Ijam  
Senior Vice President for Program and Project Services

James A. Lammers  
Executive Vice President and  
Chief Technology and Strategy Officer

Matthew D. Larson  
Senior Vice President,  
End User Services

Kathryn K. Smith  
Executive Vice President for  
Treasury Services

Robert I. Turner  
Executive Vice President and  
Chief Operating Officer

List includes members of the management council and titles as of December 31, 2017.

Front: Lyn McDermid; from the left, second row: Scott C. Furman and Robert I. Turner; third row: Ghada M. Ijam, David N. Alfano, and Kathryn K. Smith; back row: Devon A. Bryan, James A. Lammers, and Matthew D. Larson
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Information Security Architect

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Ian W. Beirnes
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Assistant Vice President

Jeanette L. Willette
Vice President

Fritz Zeigler
Operational Stack Engineer

List includes officers, senior professionals, and titles as of December 31, 2017.
Financial Statements


The Board of Governors’ Statement of Auditor Independence is provided below:

Statement of Auditor Independence
The Federal Reserve Board engaged KPMG to audit the 2017 combined and individual financial statements of the Reserve Banks.1

In 2017, KPMG also conducted audits of internal controls over financial reporting for each of the Reserve Banks. Fees for KPMG services totaled $6.8 million. To ensure auditor independence, the Board of Governors 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 2017, 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.
The Federal Reserve Bank of Richmond
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The 2017 Annual Report also is available on the Bank’s website:
www.richmondfed.org.