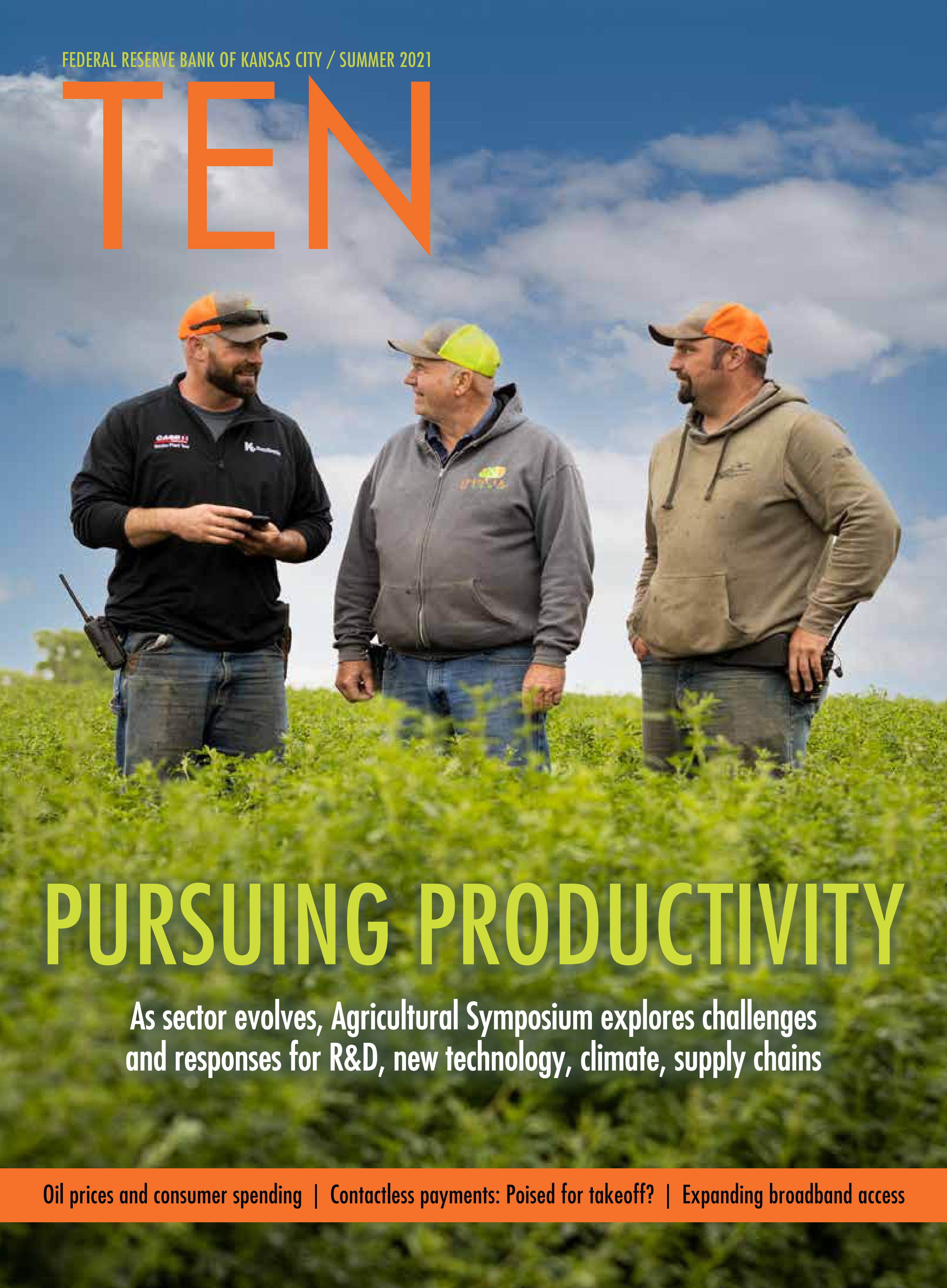

FEDERAL RESERVE BANK OF KANSAS CITY / SUMMER 2021

TEN

PURSUING PRODUCTIVITY

As sector evolves, Agricultural Symposium explores challenges and responses for R&D, new technology, climate, supply chains

Oil prices and consumer spending | Contactless payments: Poised for takeoff? | Expanding broadband access

FEDERAL RESERVE BANK OF KANSAS CITY / SUMMER 2021

TEN

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TEN magazine is a quarterly publication of the Federal Reserve Bank of Kansas City focused on the connection between the Bank's research and the Tenth Federal Reserve District. TEN features articles on the Federal Reserve's history, structure and operations. The views and opinions expressed in TEN are not necessarily those of the Federal Reserve Bank of Kansas City, the Federal Reserve System, its governors, officers or representatives.

Learn more about the Federal Reserve Bank of Kansas City and the history, leadership and governance of the Federal Reserve System at *KansasCityFed.org/aboutus.*

FEATURES

ON THE COVER» *Kevin Spencer and sons, Brad and Aaron, of Spencer Farms in Ottawa, Kansas. Photo by Gary Barber, Design by Alison Reichert*

Photo by Gary Barber

The outlook for demand, inflation and productivity

The Federal Reserve Bank of Kansas City's 11th annual Agricultural Symposium, which we held in May, offered an opportunity for academics, policymakers, lenders and practitioners to discuss important topics related to agricultural economics. We are proud to have sponsored this look at a sector so vital to our region, the nation and the global economy.

This year's theme focused on agricultural productivity growth. Producers and consumers of agricultural products alike benefit from productivity growth, and it has particular relevance now as strong increases in demand for agricultural products coincide with a run-up in crop prices. Over the long run, productivity growth is a key determinant in whether increased demand will be met by higher supply or if prices will have to rise to dampen the strength of demand.

The importance of productivity growth extends well beyond agriculture. It plays an essential role in the long-run pace of economic growth, as well as the living standards and incomes of households. Productivity growth also lies at the intersection of demand growth and price inflation—a relationship that is attracting quite a bit of attention these days. It's important to note the role of productivity growth as a consideration for the nation's economic outlook, and consequently, the outlook for monetary policy.

The economic outlook

Since the pandemic upended the global economy a little over a year ago, we have made considerable progress along the path to economic recovery. By many measures, the gaps that opened in early 2020 have narrowed. Real gross domestic product (GDP), the broadest measure of the nation's economic output, increased at a robust 6½% annual rate in the first quarter. The unemployment rate, at just over 6% in April, has improved considerably from its peak a year ago of nearly 15%.

That progress alone is reason to be optimistic. Even so, we remain more than 8 million jobs shy relative to pre-pandemic levels. While this shortfall partly reflects the still-elevated unemployment rate, another factor has been a decline in labor force participation, with many potential workers sitting on the sidelines.

As we look ahead, I anticipate strong employment growth in the coming months, particularly in contact-intensive industries such as hospitality and live entertainment, where the rebound in jobs so far has been incomplete. The outlook also is supported by an extraordinary amount of policy stimulus, both fiscal and monetary. Fiscal transfers have led to a considerable improvement in household balance sheets, with an accumulation of savings far in excess of normal levels. In fact, the outlook is so strong that the discussion quickly has shifted from demand shortfalls to supply constraints.

Key questions on the horizon

In gauging the economy's progress, I see three big, and somewhat sequential, questions that policymakers will grapple with over coming months. First, how actively will consumers spend down the excess savings that many households accumulated during the pandemic? Second, will limited supply and bottlenecks constrain this urge to spend, or will production, possibly supported by productivity growth, be able to keep up with a rush in demand? And third, if strong demand runs up against production constraints, will the effect be a temporary increase in prices and inflation, or a more persistent change in price-setting behavior of businesses?

Starting with the outlook for household spending, healthy balance sheets suggest that households have the capacity to spend. If and how quickly households spend down their excess savings likely will be an important determinant of the pace of growth over the next few years. While households could draw down their savings quickly, several factors suggest people may want to hang on to at least a portion of their accumulated savings. Households now are painfully aware of new economic risks that might not have been a consideration a little over a year ago. With this recent experience of an economic shutdown, they may wish to keep higher amounts of liquid assets relative to the past. Also, since the fiscal transfers largely have been temporary, consumers might not want to materially change their spending decisions in response to only a short-lived increase in income.

Photo by Gary Barber

On the second question, will supply constraints impede growth? We certainly are hearing anecdotal evidence to this effect, with labor, materials and transportation services reported as being in short supply. For labor, this shortage reflects the still-depressed level of labor force participation I discussed earlier. How quickly supply can grow to meet higher demand likely will depend, at least in part, on the factors behind the decline in labor force participation. Some of the fall likely is due to the pandemic, either through restrictions on activity, lack of childcare, enhanced unemployment benefits, or fear of contagion. As the pandemic fades and time passes, these factors will reverse, and labor constraints should ease. However, it also is possible that some of the decline in participation reflects a growing detachment from work for some, especially after the disruptions of the last year. This might be true particularly for workers that were near retirement. In this case, it likely will take a period of strong growth to draw these workers back in.

"THE IMPORTANCE OF PRODUCTIVITY GROWTH EXTENDS WELL BEYOND AGRICULTURE. IT PLAYS AN ESSENTIAL ROLE IN THE LONG-RUN PACE OF ECONOMIC GROWTH, AS WELL AS THE LIVING STANDARDS AND INCOMES OF HOUSEHOLDS."

— Esther George

With respect to the widespread materials and transportation shortages, some may resolve during the remainder of the year, but others are likely to persist beyond that. For example, the shift in demand from services to goods during the pandemic has led to a surge in imports, backing up traffic at U.S. ports. The resulting longer shipping times have led to a global shortage of intermodal containers that many in the agricultural industry likely have experienced. A shift in consumption patterns back to services may help alleviate these delays, but it's not clear when that may occur. For manufacturers, surging demand for commodity computer chips has run up against global capacity constraints, which require long lead times to expand.

Productivity growth has the potential to play a role in meeting any incipient rush in demand. By allowing higher output with the same inputs, productivity can loosen the capacity and labor constraints that could stifle demand and weigh on economic growth.

Predicting the evolution of productivity, however, can be difficult. Measured by output per hour of work, productivity jumped during the pandemic, averaging close to 4% at an annual rate over the past year, more than triple the average pace over the last decade. However, much of this acceleration seems likely to reverse as restaurants reopen and hotels return to full capacity given their relatively low measured productivity.

But it also is possible that certain adaptations made during the pandemic, as well as behavioral changes by consumers, could lead to a persistent increase in worker productivity. For example, over the past year, restaurants saw customers shift toward curbside pickup or home delivery. By adapting to this shift, restaurants were able to produce a similar product with less labor input. Similarly, the pandemic has led organizations to rethink the role of business travel. Travel is an expensive input for many businesses, and a shift toward far cheaper digital interactions could lead to significant cost savings and increased productivity. On the other hand, one could argue that hosting a conference on Zoom is a poor substitute for in-person engagement and perhaps could even depress productivity. This is all to say, that a lot remains to be sorted out regarding the pandemic's effect on productivity. More generally, tight labor markets often incentivize productivity-enhancing innovation. For example, you see this at retail stores, where self-checkout is becoming more common.

Turning to the third question, how will the dynamics of a strong economy and supply constraints affect inflation? Inflation over the 12 months ended in April, as measured by the consumer price index (CPI), increased to 4.2%, the fastest pace in over a decade and up considerably from the 1.4% pace at the start of the year. What the current pace of inflation means for the inflation outlook for the medium term is less than clear. Many factors that have boosted current inflation seem likely to fade over time. For example, the average price of a gallon of gasoline fell to $1.87 last April as demand fell sharply and inventories accumulated rapidly. Remarkably, these factors actually pushed the spot price of oil below zero for a moment last year. This April, as demand has recovered with a reopening economy, the average price per gallon hit $2.96, an almost 60% increase from a year earlier, but about equal to the average price over the previous 10 years. This normalization in the price of gasoline contributed almost a percentage point to the overall rate of inflation in April.

Gasoline of course is not the only price bouncing back as the economy reopens. Some services that suffered large price declines early in the pandemic, including air travel and hotel accommodations, saw prices jump in April, even as they remain considerably below pre-pandemic levels. As these sectors recover, there certainly is scope for further strong increases, although I would expect as these prices recover, the pace of increase will slow.

A normalization of prices depressed by the pandemic doesn't tell the whole story though. Other sectors have seen prices jump far above pre-pandemic levels as supply constraints have developed against a backdrop of robust demand. This is true particularly for automobiles, where production disruptions have contributed to higher new car prices, with even larger spillovers to used car and rental car prices. In fact, as many recent travelers have experienced, rental car prices have increased more than 80% over the last year in the CPI data. Such bottlenecks seem likely to clear over time and stabilize prices.

Expecting these price pressures to ease, however, does not ignore the potential for more persistent inflation pressures. Over the long term, the outlook for inflation is influenced by demand that is sufficiently strong across a wide range of goods and services that it pushes the overall economy up against its productive capacity. In the near term, it can be difficult to distinguish between a string of seemingly idiosyncratic bottlenecks and a broader-based lack of capacity. In the end, the persistence of any step up in inflation ultimately will depend on the pricing behavior of firms and workers, which in turn importantly will be affected by expectations for future inflation.

Measures of inflation expectations, both from surveys and financial markets, have moved up as the economy has reopened and strong fiscal stimulus has boosted growth. These and other indicators of pricing behavior will provide important signals about the longer-run trajectory for inflation. Prior to the pandemic, the economy had experienced a long period during which inflation pressures remained muted even as the economy appeared to be running near capacity. The apparent lesson from this period was that the inflation process had changed relative to earlier decades, a shift that the Federal Open Market Committee (FOMC) acknowledged last year in the adoption of its new monetary policy framework. Although providing the context for the revised framework, the cause of this shift in inflation dynamics remains relatively obscure. As such, an overarching takeaway from this period might be that the inflation process can change, and that changes can be relatively persistent.

While it is clear that several temporary factors are boosting inflation now, I am not inclined to dismiss today's pricing signals or to be overly reliant on historical relationships and dynamics in judging the outlook for inflation. The past few decades saw inflation play a relatively minor role in the day-to-day decision-making of businesses and consumers. Maintaining this state of affairs as we seek to achieve our objectives for maximum employment and price stability will be important.

The outlook for monetary policy

As the pace and strength of the recovery unfolds, monetary policy settings remain highly accommodative and will remain so for some time in line with the FOMC's forward guidance. The Committee has stated that it expects to keep the policy rate near zero until the labor market has reached levels consistent with maximum employment and inflation has risen to 2% and is on track to moderately exceed 2% for some time. The FOMC also expects to maintain its purchases of Treasuries and mortgage-backed securities until substantial further progress has been made toward these employment and inflation goals.

Judging the appropriate timing for policy adjustments always is challenging. The economy is an incredibly complex set of relationships, many of which have been disrupted by the pandemic with uncertain long-term consequences. This is true for how we consume, how we produce and how we work. As the economy works its way toward a new equilibrium, policymakers will be well served to take a flexible approach to monetary policy decisions, in my view. In this regard, the Federal Reserve's revised framework for monetary policy, adopted last August, provides a "framework," rather than a "rule." The FOMC in the past has avoided strict adherence to monetary policy rules, so it is unsurprising that the revised framework is not a precise prescription for policy action even as it repositions the Federal Reserve's approach to achieving its congressional mandates for employment and inflation.

The structure of the economy changes over time, and it will be important to adapt to new circumstances rather than adhere to a rigid formulation of policy reactions. With a tremendous amount of fiscal stimulus flowing through the economy, the landscape could unfold quite differently than the one that shaped the thinking around the revised monetary policy framework. That suggests remaining nimble and attentive to these dynamics will be important as we seek to achieve our policy objectives in the context of sustainable economic growth and the well-being of the American public.

This message is adapted from a speech President George delivered virtually May 24, 2021, at the Kansas City Fed's 2021 Agricultural Symposium.

Esther George was photographed in May at her family's farm near St. Joseph, Missouri. George's video introduction for this year's Agricultural Symposium was filmed at the farm. See it in the Kansas City Fed YouTube channel. *Photo by Gary Barber*

Notes from around the Tenth District

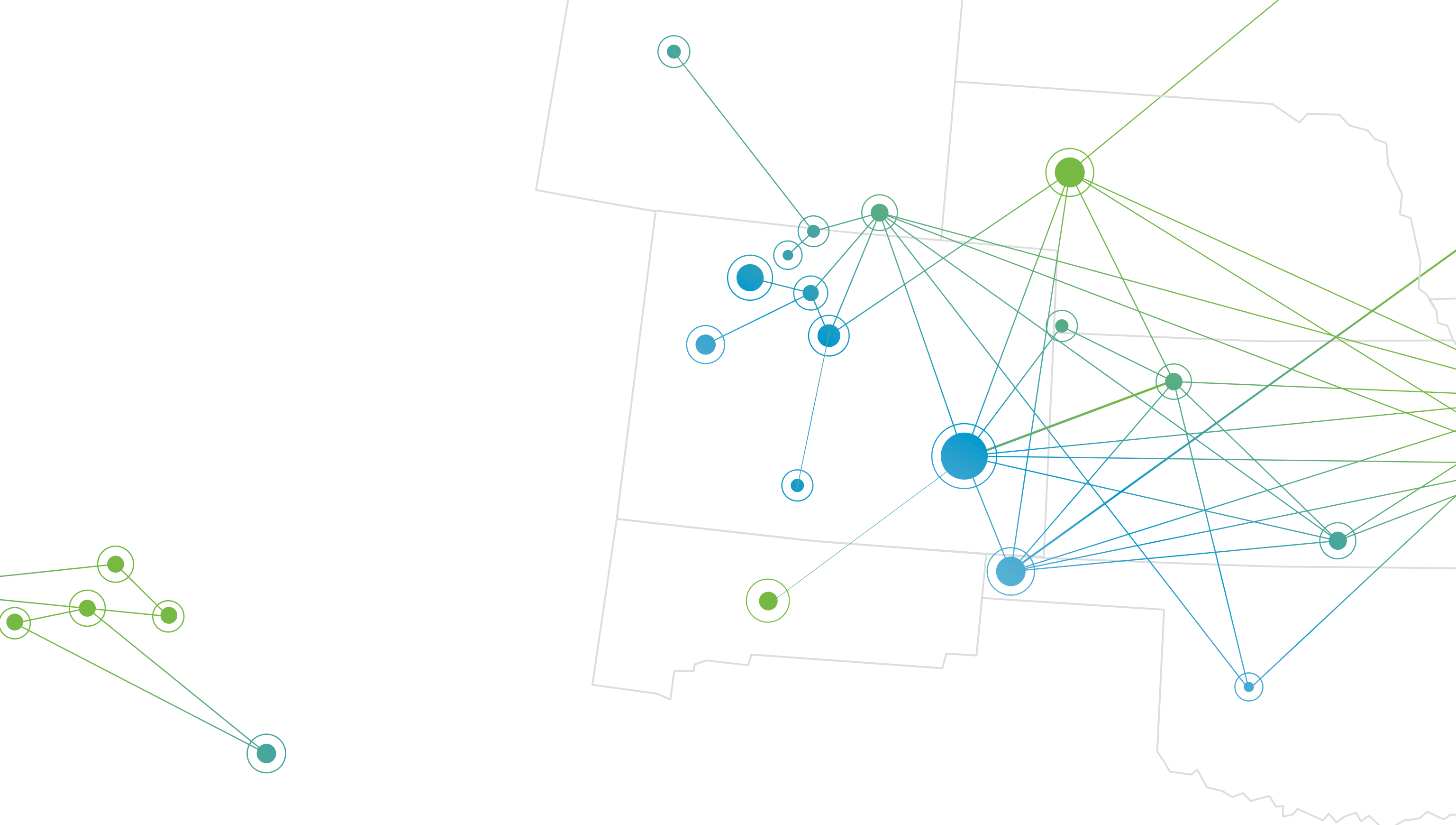
Fed Listens initiative to continue in 2021

Chair Jerome Powell spoke at the 2019 Fed Listens session in Kansas City. *Photo by Gary Barber*

The Federal Reserve in June announced that it will continue its Fed Listens series this year to learn from individuals, households and communities about economic recovery from the COVID-19 pandemic.

"During the Federal Reserve's 2019 monetary policy framework review, the Fed Listens series of events provided valuable feedback from a broad range of groups and communities on the state of the economy and on issues related to our monetary policy goals," Federal Reserve Governor Michelle W. Bowman said. "Continuing the initiative in years that we are not reviewing our framework will similarly benefit the Federal Reserve's ongoing policymaking process, while also enhancing transparency and public accountability."

In 2019, the Kansas City Fed hosted a Fed Listens session with Federal Reserve Chair Jerome Powell. Community and business leaders took part in a roundtable discussion with Powell and Bank President Esther George. Plans for the next Fed Listens session in the Tenth District will be available at a later date. See updates at *FederalReserve.gov/fedlistens.htm*.



Block promoted to senior vice president, general auditor

Porcia Block, who most recently served as a vice president in the Supervision and Risk Management Division of the Federal Reserve Bank of Kansas City, has been promoted to senior vice president and general auditor.

Block is now responsible for leading the Bank's Audit Division, which provides an independent and objective assessment of the Bank's internal controls, risk management and governance processes to the Board of Directors and senior management. She serves as an advisor to the Bank's Management Committee.

Block joined the Bank in 1998 and was appointed to the official staff in 2016. In 2017, she became recording assistant secretary to the Bank's Board of Directors.

Block has a bachelor's degree in finance from Creighton University and an MBA from Benedictine College. She also is a graduate of the Graduate School of Banking in Boulder, Colorado.

Photo by Gary Barber

Mehra promoted to senior vice president

Renu Mehra has been promoted to senior vice president and Retail Payments Office chief information officer at the Kansas City Fed.

Mehra had been group vice president in the Retail Payments Technology Services Division (RPTS). In the new role, Mehra has oversight for the technology platforms, functions and projects supporting both ACH and check payments that are processed and settled by the Federal Reserve. She joins the Retail Product Office's senior leadership team, reporting to Federal Reserve Bank of Atlanta Executive Vice President Cheryl Venable. Mehra also is now on the Kansas City Fed's Management Committee, reporting to First Vice President Kelly Dubbert.

Mehra joined the Bank in 1991 and was appointed to the official staff in 2002. She has been responsible for a variety of business areas within RPTS and was the Bank's recording assistant secretary in 2010. Mehra was promoted to vice president in 2012 and became group vice president in March 2020.

Mehra has a bachelor's degree in economics from Panjab University in India and an MBA in accounting from the University of Missouri-Kansas City. She also is a graduate of the Banking Administration Institute's Graduate School of Bank Operations and Technology.

Photo by Gary Barber

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FURTHER RESOURCES
Learn more about the Bank's senior management at *KansasCityFed.org/about-us/leadership.*

Miller appointed assistant vice president and Community Affairs officer

Photo by Elements Studio Photography

Teesha Miller, former executive director of Youth Ambassadors Inc. in Kansas City, has joined the Kansas City Fed as assistant vice president and community affairs officer.

Miller leads the Tenth District's Community Development Division, which works to address pressing community and economic development challenges faced by low- to moderate-income (LMI) communities and small businesses. Miller also will manage the Bank's Community Development Advisory Council, which includes business leaders, educators, financial institutions and nonprofit leaders who serve LMI communities.

Miller holds bachelor's and master's degrees from Park University and serves on the community advisory board at the Cleaver YMCA in Kansas City.

Jacewitz joins Bank as research and policy officer

Photo by Gary Barber

Stefan Jacewitz recently joined the Kansas City Fed's Economic Research Division. As research and policy officer, Jacewitz leads the department's analysis of the banking sector and the financial system.

Jacewitz has 12 years of experience in banking research, regulation and supervision. For the last seven years he served as chief of the Quantitative Risk Analysis Section at the Federal Deposit Insurance Corporation in Washington. Earlier Jacewitz served as a senior financial economist at the FDIC. He has published academic papers in the *Journal of Econometrics* and the *Journal of Financial Services Research* and has authored several staff reports, mainly concerning community banks.

Helping households cover costs of broadband access

The Kansas City Fed and other Reserve Banks are helping raise awareness of the Emergency Broadband Benefit (EBB), a program through which American households may apply for help to pay for computers and home internet service.

The $3.4 billion program launched May 12 and, for eligible households, provides up to $50 a month ($75 for households on tribal lands) toward a home internet subscription and a $100 discount toward a computer.

"Millions stand to benefit, but those most in need of internet service often are the hardest to reach," said Jeremy Hegle, a Kansas City Fed senior community development advisor and leader of a Bank initiative to bridge the digital divide.

FURTHER RESOURCES

For more information, visit *KansasCityFed.org/community*. View an EBB promotional toolkit at *FCC.gov/emergency-broadband-benefit-outreach-toolkit*.

Bank Anniversaries

The following banks in the Tenth Federal Reserve District are celebrating 20 or more years as Federal Reserve members in July, August and September.

Uinta Bank	Mountain View	Wyo.	101
Wahoo State Bank	Wahoo	Neb.	89
Gunnison Bank and Trust Co.	Gunnison	Colo.	81
Union State Bank	Clay Center	Kan.	79
Bank of Holyrood	Holyrood	Kan.	78
Farmers Bank of Lincoln	Lincoln	Mo.	76
Security State Bank	Basin	Wyo.	73
Five Points Bank	Grand Island	Neb.	24
State Bank of Burrton	Burrton	Kan.	24
America's Community Bank	Blue Springs	Mo.	23
Bank of Bennington	Bennington	Neb.	22
Payne County Bank	Perkins	Okla.	22
Farmer's State Bank	Quinton	Okla.	22
First Pryority Bank	Pryor	Okla.	21
Lakeside Bank of Salina	Salina	Okla.	21
Security Bank	Tulsa	Okla.	21
Bank of Locust Grove	Locust Grove	Okla.	21
American Exchange Bank	Elmwood	Neb.	20

Photo by Getty Images

COVID-19 RESEARCH

Turning toward recovery

As coronavirus vaccinations continue and social restrictions are eased, consumers and businesses are hopeful that economic conditions are improving. Research by Kansas City Fed economists continues exploring a range of topics related to the effects of COVID-19. Full articles and reports are available at *KansasCityFed.org/research.*

Cell phone data: Exploring work-from-home differences by income, race and education

The COVID-19 pandemic has transformed how Americans work, but not everyone has been affected equally. A Kansas City Fed research study provided a high-frequency proxy for work-from-home behavior and assessed how work from home has evolved over time and across income, race and education. The study found that even after accounting for the prevalence of teleworkable jobs, areas that are lower-income, majority-minority or majority-lower-educated have experienced less of an increase in work from home than other areas. This suggests that factors beyond whether a worker is in a teleworkable occupation seem to influence whether a worker has experienced a greater increase in telework during the pandemic.

—Nida Çakır Melek and Sungil Kim,
March 2021 Economic Bulletin

Photos by Getty Images

Examining recovery in Rocky Mountain leisure and hospitality employment

The number of consumers receiving the COVID-19 vaccines continues to grow, and restrictions on restaurant capacities are beginning to ease. With an eye toward these improving conditions, consumers have pent-up demand for travel, the chance to dine in at restaurants and attend public events. These factors support the outlook for a swift recovery in employment for leisure and hospitality workers. However, a return to pre-pandemic levels of employment for these workers may take more than a surge in consumer spending. Declines in business travel, reduced office occupancy as workers continue to work from home, and limited attendance at conventions may stall the return to peak levels of demand for food and accommodation businesses. The Kansas City Fed explores the different factors that support the employment outlook for restaurant, hotel and entertainment workers, as these are the workers who continue to face the most significant levels of job loss because of the pandemic.

— Nicholas Sly and Bethany Greene, April 2021
Rocky Mountain Economist

Nebraska's economy outperforms through crisis and recession

Throughout the crisis and recession, Nebraska's economy has outperformed that of many other states and the nation as a whole. A year ago, economies across the globe were devastated by the intensifying pandemic and corresponding business closures. Despite the severe effects associated with the pandemic, economic conditions in Nebraska have remained more stable throughout the crisis. Stability has been a feature of Nebraska's economy in recent recessions for a variety of possible reasons, including the composition of industries most prevalent in the state. While significant business and economic challenges still remain, the stability of Nebraska's economy is likely to position the state well for a return to steady growth in coming months.

— Nathan Kauffman and John McCoy, March 2021
Nebraska Economist

Evaluating Oklahoma consumer spending and mobility one year later

For the past year, COVID-19 cases have disrupted in-person activities and transactions in Oklahoma. The onset of the pandemic had a significant negative effect on consumer spending, mobility and employment in the state. While consumer spending rebounded relatively quickly as government stimulus programs were put in place and as consumers shifted to online purchases, mobility and employment in the sector—especially in leisure and hospitality—remained below pre-COVID levels as new cases surged during the second half of 2020. Since the vaccination roll-out of early 2021, new COVID-19 cases have dropped, and mobility and employment have trended upward again. However, full recovery in the sector is unlikely until people begin moving around more. The share of Oklahomans receiving COVID vaccines so far has outpaced the nation, and the path of the virus and vaccinations likely will be a key determinant in the pace at which jobs recover in the state.

— Chad Wilkerson and Courtney Shupert, March 2021 Oklahoma Economist

Improving economic conditions reaching LMI communities

Since the Kansas City Fed's previous Low-to-Moderate Income (LMI) Economic Conditions survey, in November 2020, the pandemic and its effects have subsided substantially. Case numbers and deaths from COVID-19 are down. Vaccines have become widely available. Meanwhile, the March jobs numbers showed the economy is recovering. Congress also passed the $2 trillion American Rescue Plan (ARPA) in March, providing much-needed assistance to those still struggling through the effects of the pandemic. This recovery was evident in results of the LMI survey conducted March 22 to April 1, 2021. Economic conditions generally are improving for LMI populations across all categories. Optimism for LMI economic conditions into the next quarter was at record highs for the survey's index. This survey asked special questions related to the ARPA, efforts respondents are taking to address educational disparities that have grown over the past year, and any efforts respondents are seeing that are having a noticeable effect on addressing racial equity.

— Steven Howland, First Quarter 2021 LMI Survey

Making a CONNECTION

In founding the Federal Reserve more than a century ago, Congress recognized the importance of connecting the nation's central bank to the Main Streets of America. The Federal Reserve Bank of Kansas City carries out this role through its president and its programs and activities across Colorado, Kansas, western Missouri, Oklahoma, Nebraska, northern New Mexico and Wyoming. Here is a glimpse at the recent activities of President Esther L. George and the staff of the Kansas City Fed.

KANSAS, MISSOURI and BEYOND »

George travels to Oklahoma City for speech to bankers, visits with directors

President Esther George traveled in late May to Oklahoma City, where she delivered the keynote speech at the Oklahoma Bankers Association's annual conference. The event was George's first in-person public speaking engagement since March 2020. The event included a tribute to association President and CEO Roger Beverage. George thanked Beverage for his leadership over the years. Before speaking at the bankers' conference, George visited with directors from the Oklahoma City Branch and head office boards. She also visited the headquarters of Love's Travel Stops and toured the new First Americans Museum, which is scheduled to open to the public in September. The museum documents the collective histories of 39 distinctive First American Nations in Oklahoma today. Learn more at famok.org.

Roger Beverage, who retired this year, had led the Oklahoma Bankers Association since 1988.

Esther George's address to the Oklahoma Bankers Association marked her first in-person public speech since spring 2020. Her remarks, "The Outlook for the Economy and Banks,"are available at *KansasCityFed.org/speeches.*

At Lake Hefner in Oklahoma City in May (from left):Kansas City Fed Senior Vice President Diane Raley, Oklahoma City Branch Director J. Walter Duncan, President Esther George, Kansas City Director Doug Stussi, Oklahoma City Branch Director Katrina Washington and Oklahoma City Branch Executive Chad Wilkerson.

Special-guest appearance on RFD-TV

Esther George was the special guest on the May 17 broadcast of RFD-TV's "Health Matters" show. George joined host Tammi Arender and Jeffrey P. Gold, chancellor of the University of Nebraska–Omaha and its medical school, for a discussion of topics related to COVID-19 and the economy. George explained the Federal Reserve's role in ensuring a safe and stable financial system, even in times of stress such as the pandemic. RFD-TV, operated by Rural Media Group Inc. of Omaha, provides multimedia content "dedicated to the rural and Western lifestyle." The May 17 broadcast may be viewed at *youtube.com/watch?v=84WVMoTAEjU*.

COVID-19 and the economy were the discussion themes when Esther George appeared on RFD-TV's "Health Matters" show.

'Racism and the Economy' series

In April, Esther George provided opening remarks for "Racism and the Economy: Focus on the Economics Profession," the fifth installment of a seven-part series hosted by the Federal Reserve Banks of Atlanta, Boston and Minneapolis. The series explores the implications of structural racism in America's economy and aims to advance actions to improve economic outcomes for all. The fifth installment concentrated on how racism affects the people and practice of economics. It included discussions of ways to improve economics research practices and professional processes to achieve greater diversity, expand avenues of inquiry and better inform public policy. Learn more about the series at *MinneapolisFed.org/policy/racism-and-the-economy*.

Kansas City Fed staff members and law enforcement officers were in attendance in May at Legends Field in Kansas City, Kansas, for the home opener of the Kansas City Monarchs (formerly the T-Bones). The Tenth District Honor Guard carried the colors at the minor league baseball game. Officers pictured with Esther George (left to right): Johnny Smith, Bryan Kendrick, Robert Chmidling and Edgardo Melo.

Virtual speech for Missouri bankers' group

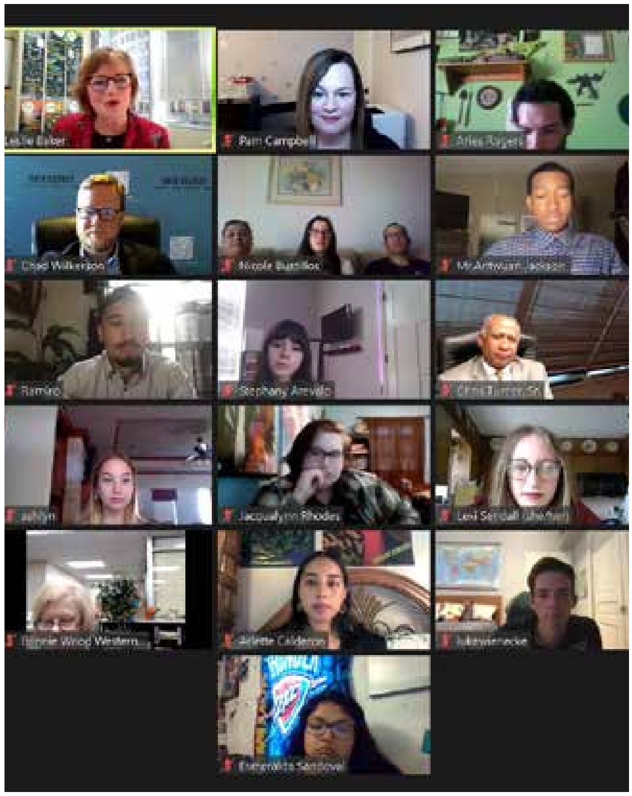
On May 14, Esther George spoke virtually to the Missouri Independent Bankers Association. George's remarks were live streamed as about 100 members of the group met in person for an annual seminar of directors and officers at the Lake of the Ozarks. Participants also had the option to view the event offsite and virtually.

Topics in Esther George's remarks for Missouri Independent Bankers included the progress of the economic recovery, the Fed's policy stance and observations on the banking system.

George discusses Kansas City's economic recovery

Esther George was among the business and community leaders who appeared in a William Jewell College video in April that explored the health of the Kansas City region. In the video, George speaks about the strength of the Midwest's economy during the COVID-19 pandemic. The video, titled "Kansas City's Resilience," was part of an online event produced by the college and can be viewed in the William Jewell College YouTube channel.

WILLIAM JEWELL COLLEGE



Pinning ceremonies marked completion of the 2020-21 Student Board programs across the District.

Student Boards of Directors finish virtual program

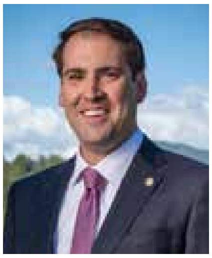
The 2020-21 Student Board of Directors programs finished recently with virtual pinning ceremonies. Sixty-nine students completed the online program across the Tenth District in Albuquerque, Denver, Kansas City, Oklahoma City and Omaha. Throughout the year, students learned about the missions of the Fed, careers, financial management, business etiquette, the local economy and networked with the Bank's Board of Directors. Christopher Turner, Oklahoma City Branch Board member and president and CFO of The First State Bank, was the keynote speaker for the Oklahoma City Branch Student Board pinning ceremony.

Outstanding Economic Student Awards

The Oklahoma City Branch observed its 11th Annual Outstanding Economic Student Awards by selecting six students from schools across the state. The virtual program was April 29 and added the six to the 121 students honored since the program began.

Branch executives connect with business leaders

Denver Branch: Nicholas Sly shared his thoughts with the Downtown Denver Partnership on key trends and data for the U.S. and Colorado economies. This roundtable discussion with business and community leaders was an opportunity to hear directly about happenings in the region.



Oklahoma City Branch: Chad Wilkerson recently spoke to members of the Norman Business Association and Bartlesville Downtown Financial Forum. He shared economic outlooks for the U.S. and Oklahoma economies, while specifically discussing the economic indicators of energy and manufacturing.

Omaha Branch: Nathan Kauffman provided an update on the economic recovery in U.S. agriculture for Nebraskans as part of the University of Nebraska-Lincoln's "Farm and Ranch Management Webinar Series." Also, during a virtual presentation to the Midwest International Trade Association's World Trade Conference, Kauffman provided an update on broader U.S. and regional economic conditions. Kauffman also recently met with Don Bacon, representative for Nebraska's 2nd Congressional District, to discuss the economic recovery, small business conditions and the state's housing market.

Evening with the Fed series concludes with President George

The Kansas City Fed hosted five sessions of Evening with the Fed in 2021, with Esther George ending the series with a discussion about the coronavirus and the implications for the economy and monetary policy. Evening with the Fed is a professional development program for educators. In addition to the program from President George, other topics included energy, agriculture, climate change and career skills for the 21st century.

Esther George, Historian and Executive Writer Timothy Todd and Community/Public Affairs Specialist Trudie Hall led the May 5 installment of the Evening with the Fed series, which focused on the economic effects of COVID-19.

Community Development hosts virtual conference to discuss benefits cliffs

Benefits cliffs are a reality for many workers as they move up the ladder—when that sought-after raise might result in a greater loss in public assistance. The Oklahoma City Branch and the Oklahoma Workforce Association hosted more than 360 participants in a virtual conference on the issue. Participants gained hands-on experience with Oklahoma's CLIFF Dashboard, a new customized tool that helps individuals understand how their career progression and public benefits interact to support financial stability.

Virtual career event for Omaha elementary students

Omaha Branch Public Affairs Specialist Nicole Downs participated in a virtual career event for Betz Elementary School in Omaha. Students heard from 12 presenters about their careers, which ranged from professional basketball players to veterinarians. Nicole shared her journey starting in college as a teaching major to her role working in Public Affairs for the Kansas City Fed.

INTO THE SPOTLIGHT

Boosted by safety concerns during the pandemic, are contactless payments finally ready for center stage?

The U.S. payments industry has long expected contactless payments to take off, but actual consumer adoption of these payment methods had been slow before the COVID-19 pandemic. The pandemic created demand for more hygienic, touch-free alternatives, leading to a significant increase in contactless payment adoption and raising an important question: Has contactless technology finally met the moment?

Kansas City Fed Senior Payments Specialist Terri Bradford explores this topic in a Payments Systems Research Briefing published in April 2021. The full article is available at *KansasCityFed.org/research.*

THE HISTORY

For nearly 20 years, the payments industry has expected contactless payments to catch on with U.S. consumers and merchants, driven mainly by two technologies: near-field communication (NFC) and quick response (QR) code.

THE TECHNOLOGY

With NFC, a consumer must have a payment card or device (smartphone, smartwatch, etc.) with a chip embedded. For the payment device to transmit payment information at the point-of-sale (POS), the POS terminal must have radio frequency identification (RFID) technology enabled. This combination in close proximity to the terminal allows data to be shared through several layers of authentication. The QR codes can be either dynamic or static. Dynamic codes are specific to each individual transaction. Static codes are unique to an individual merchant or consumer and do not vary by transaction.

THE LAG

Consumer adoption of contactless payments lagged for several reasons. Card issuers were slow in getting contactless cards with embedded chips to customers. Many retailers lagged in accepting chip-based payments because it was costly and complex. Of those who adopted chip technology, many didn't enable RFID. And even when retailers enabled RFID and accepted digital wallets, consumers were slow to change their own POS habits. The increased security and speed of contactless payments weren't enough to drive wide adoption.

THE CHANGING TIDE

The COVID-19 pandemic seems to have provided a more compelling reason to adopt contactless payments: the desire for an alternative to touching cash, PIN pads or a pen for signature-based payments. According to Mastercard Contactless Consumer Polling, more than half of consumers now use some form of contactless payments. Merchants ranging from dine-in and quick-service restaurants to major retailers and gas stations have been adopting various forms of contactless technology for payments, loyalty programs and other purposes.

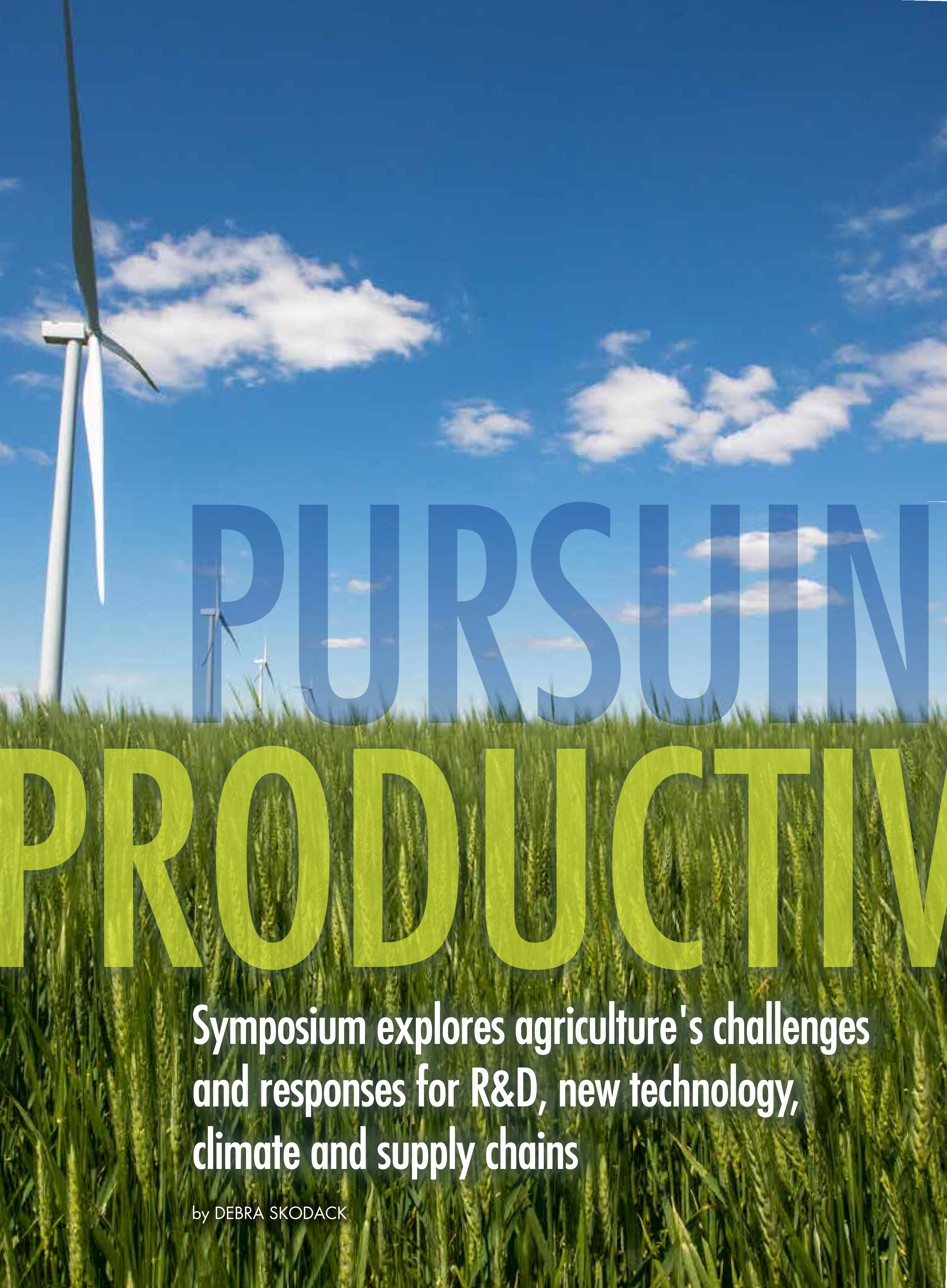
THE OUTLOOK

The 2021 Visa Back to Business study found that nearly half of surveyed consumers thought that a contactless payment option is one of the most important safety measures stores can offer. Sixty-five percent said that post-vaccine availability, they would prefer to use contactless payments as much as or even more than they do now. Only 16% of consumers said they would revert to their old methods of payments even after a vaccine is widely available. Furthermore, 85% of surveyed consumers have come to expect digital options when they shop in person. As for the method of contactless payment, 62% expect to be able to tap a credit or debit card, 41% expect to be able to use mobile payment apps, and 37% expect an option to pay with a mobile wallet.

THE CONCLUSION

This momentum may present the best opportunity yet for meaningful, sustained adoption of contactless payments. However, whether the pandemic has provided a tipping point is still anyone's guess.

Scan this code to read the Payments System Research Briefing on your device.



PURSUIN PRODUCTIV

Symposium explores agriculture's challenges and responses for R&D, new technology, climate and supply chains

by DEBRA SKODACK

Each year, the agricultural sector continues to evolve, grow and adapt. Farm production always has responded to the needs of a global population against a backdrop of ever-changing constraints and challenges.

Challenges to the sector range from weather and climate-related risks to fluctuations in commodity prices, in addition to underlying changes in the nature of demand for agricultural products.

As agriculture responds to emerging needs and challenges, improvements in productivity have been a primary outcome. That was the focus of the Federal Reserve Bank of Kansas City's annual Agricultural Symposium titled "The Roots of Agricultural Productivity Growth." The virtual event occurred in a webcast format May 24-25.

The symposium has been an annual event since 2010 and focuses on a different agriculture-related topic each year.

"Productivity is key to both maintaining farm income and maintaining the affordability of the world's foodstuffs," said Joe Gruber, Kansas City Fed executive vice president and director of Economic Research.

The effect of research on productivity was discussed in the first session of the symposium by: Top row, from left: Larkin Martin, chief executive officer, Martin Farm; Philip Pardey, professor and director, International Science and Technology Practice and Policy Center, University of Minnesota; Kimberly Ratcliff, manager, Caney Creek Ranch. Bottom row, from left: Keith Fuglie, economist, Economic Research Service, U.S. Department of Agriculture; Cortney Cowley, economist, Federal Reserve Bank of Kansas City.

"By increasing production with the same amount of land and labor, farmers are able to increase their incomes even if prices do not increase."

The symposium is part of efforts by the Bank and the Federal Reserve System to provide research, studies, surveys and data to those connected to agriculture in various ways. For those in attendance, the event provided perspective.

"The symposium is a program where we take a step back from the week to week, month to month, or even year to year, and try to consider bigger-picture issues that we think will be most relevant over the long term," said Nathan Kauffman, vice president, Omaha Branch executive and host of the symposium.

Productivity certainly is one of those bigger, long-term issues. And while challenges have evolved over time, farm production has continued to rise as producers utilize technology and modernized practices, ensuring that the needs of a growing global population are met.

Gruber said agriculture's significance as one of the core pillars of the global economy is undisputed, and that developments in the sector have wide-ranging spillovers across national borders and industry sectors.

"While the economy of the Tenth District is diversified across many industries, agriculture maintains an important role," he said. "The importance for the Tenth District comes not only from the direct production of farms, but also related industries that provide inputs to farmers and producers as well as those that process the District's agricultural output."

And beyond putting food on the table, Gruber said the Tenth District's agricultural sector plays a vital role in the nation's trade balance. A significant portion of the District's agricultural production is exported and forms a crucial part of the United States' overall exports to the world.

"This is particularly true because the sector is able to remain competitive as a low-cost and efficient producer. However, the importance of exports also means that global developments have an outsized effect on the District's agricultural sector relative to other parts of the economy," he said.

Gruber said each of the symposium's four papers provides important research-based context for understanding agricultural productivity, how productivity will evolve in the future and connections to other segments of our economy.

"On the first day of our program, for example, the papers shed light on how productivity has advanced in the past, and how factors such as technology will shape productivity in the future," he said. "On the second day, the papers sought to identify how this productivity may, or may not, relate to other segments of the economy, in addition to environmental factors that will be important for agricultural production going forward."

The four research papers included:

- "The Drivers of U.S. Agricultural Productivity Growth," by Philip Pardey and Julian M. Alston, concluded that investments in research and development are key determinants to future increases in productivity and innovation.
- "Interacting with the Next Wave of Farm Operators: Digital Agriculture and Potential Financial Implications," by Terry W. Griffin, LaVona S. Traywick and Elizabeth A. Yeager, pointed out the powerful role technology plays in productivity, a role that is likely going to increase as younger, technology-minded operators grow.
- "An Empirical Investigation of Productivity Spillovers along the Agriculture Supply Chain," by Sergio H. Lence and Alejandro Plastina, examined how changes in productivity on the farm could affect productivity in other segments of the economy.
- "Environmental Drivers of Agricultural Productivity Growth and Socioeconomic Spillovers," by Wolfram Schlenker, examined the environmental factors that are important contributors to the future of agricultural productivity.

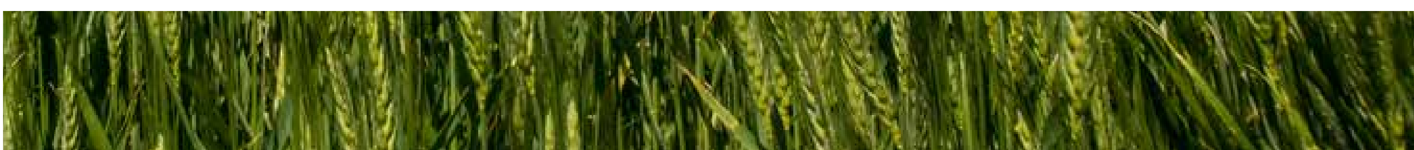
Kauffman said discussion of how developments in other segments of the economy are affecting agricultural production and supply chains is especially relevant given events of the past year related to the COVID-19 pandemic.

"Throughout the pandemic we have heard a lot of anecdotes about economic disruptions, potential shortages of various products, and bottlenecks in supply chains," Kauffman said. "Things that happen in the supply chain can happen on farms and, vice versa, things that happen on the farm can affect decisions made elsewhere in the supply chains."

Kauffman said there is a uniqueness to agriculture that sets it apart from other industries.

"It is one of those rare types of industries that starts from something of very basic value – sunlight, water

Nathan Kauffman, Omaha Branch executive, vice president and economist, hosted the Agricultural Symposium.



and land, for example, and ultimately gets value added to it all along the supply chain from that point on," Kauffman said. "There are not a lot of other industries that start from basic things like that and produce something of substantial value from it."

Agriculture has perhaps the longest history as an economic sector in the world economy.

"There is an abundance of data on the agricultural sector, much of which is publicly available given a public need for transparency in a sector with so many independent operators," Gruber said. "The sector also has a rich history of research, particularly in regard to the pricing of commodities and the interaction with financial markets."

The research and the discussion on agricultural productivity is just a start.

"The questions are far from being answered," Gruber said. "This is an exciting and dynamic area for future research."

FURTHER RESOURCES
Visit *KansasCityFed.org/agriculture* to learn more about the Bank's annual Agricultural Symposium and its research related to the ag sector.

DIGITAL AGRICULTURE BOOSTS PRODUCTIVITY, PROFITABILITY
Multigenerational farms more likely, quicker to adopt new technology

by SU BACON

By all appearances, dirt is dirt — until it's time to make a decision about buying farmland.

"If the dirt is depleted of nutrients, it could take truckloads of fertilizer to fix it," said Kevin Spencer, who owns and operates Spencer Farms in Ottawa, Kansas, with his sons Aaron and Brad.

For prospective buyers considering available land, the Spencers will test and analyze the soil and make recommendations about its potential as profitable farmland.

Soil analysis is among the farm management services Spencer Farms provides.

The Spencers manage farms for investors, and they farm 11,000 of their own acres in east-central Kansas.

STUDIO 10 VIDEO
Bank videographers Brett Smith and Kevin Wright traveled to Spencer Farms in Ottawa, Kansas to learn how technology affects productivity in agriculture. Go to KansasCityFed.org/ten to see interviews with owner and operator Kevin Spencer. Photo by Brett Smith

Spencer said they make use of all the technology available to them to grow their own crops and manage farms for others: automated guidance, aerial imaging, yield mapping and monitoring, grid soil sampling, variable rate seeding and whatever is newest and next.

"We have adopted all of the technology," Spencer said. "It starts with the young people."

Kevin Spencer is 62. His sons Aaron and Brad are 37 and 34, respectively.

"Without my children beside me, this old dog might not have learned new tricks," he said.

Research supports Spencer's sentiment. Terry Griffin found that multigenerational farms are more likely and quicker to adopt new technology than a single-generation farm.

Griffin is an associate professor and cropping systems economist in the Department of Agricultural Economics

Aaron Spencer uses Case 500 Quad Track display screens and mapping technology at his family's farm operation in Ottawa, Kansas. *Photo by Gary Barber* at Kansas State University. His paper, "Interacting with the Next Wave of Farm Operators: Digital Agriculture and Potential Financial Implications," co-written with LaVona S. Traywick and Elizabeth A. Yeager, was presented at Agricultural Symposium.

He studied the demographics of Kansas farmers and their willingness to embrace digital agriculture. Overall, the readiness varied according to the age of the farmer. Mindset and money also were important.

Though eager to try new technology, for example, "a millennial alone might not have the funds," Griffin said. But if the millennial works a farm with an older generation, such as a baby boomer, there tends to be money to invest in farm equipment and software.

"Millennials on multiple-operator farms adopted much more technology than millennials on sole-proprietor farms," Griffin said.

Griffin found that nearly half of the farmers in Kansas are baby boomers, born between 1946 and 1964. Their predecessors, the Silent Generation, represent about 20%.

As the older generations retire in the next 10 years, Griffin looked ahead to the next wave of farm operators — Generation X, born between 1965 and 1980, and the millennials, 1981 to 1996.

"There's no doubt that digital agriculture can improve productivity and profitability for farmers who have the energy and desire to make technology work for them," Griffin said.

Yet despite a strong interest in technology among the younger generations, there are barriers to adopting agricultural advances. Access to broadband in rural areas can be an issue.

"To fully use digital agriculture, broadband needs to be as ubiquitous as electricity and running water," Griffin said. "Do you want to buy land if you know you couldn't monitor your employees because there was no broadband there?"

Some, however, may balk if the technology seems difficult. "Use depends on ease of learning," said Traywick, associate professor at Arkansas Colleges of Health Education and one of the authors of the research.

Millennials expect technology to be as easy as a screen at their fingertips.

"They have never not known cell phones," Traywick said. "They want to be able to see the results of moisture monitors in the field on their cell phones."

Making technology easy to adopt, easy to use and easy to diagnose a problem are what guides agricultural advances at John Deere, said Deanna Kovar, vice president, production and precision ag production systems.

Digital agriculture was introduced in the late 1990s with automatic guidance systems, Kovar said.

The 2000s were all about guidance, the 2010s about cloud computing, and the 2020s will be about automating more elements of decision-making.

"By the mid- to late 2000s automation had improved productivity and the quality of life for farmers," Kovar said.

Now the question has become "Where can automation make it easier for farmers?"

New John Deere equipment, for example, allows a farmer to spray herbicide selectively when fields are fallow.

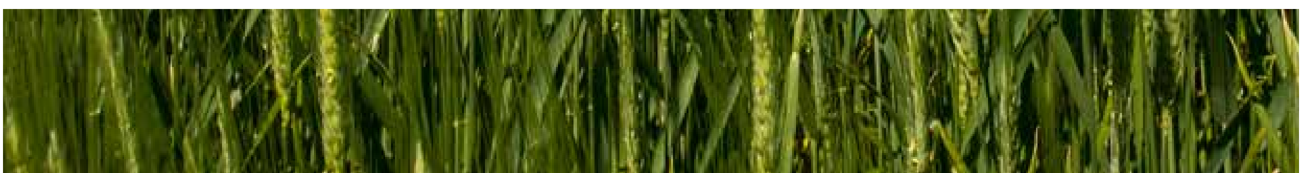
"A camera is used that can discern the difference between green and brown — weeds and dirt," Kovar said. "This can reduce herbicide usage by 80 percent."

Because a farm's debt-to-asset ratio tends to influence a farmer's decision to invest in new technology, cost is a consideration.

But upgrading doesn't have to mean buying a new fleet.

"It's all retrofittable," Kovar said.

Today's barriers to adopting technology may change as farms change hands. The farmers of the future may be able to accept and use agriculture technology for its potential financial value, its practicality and its ability to allow the farm operator to meet specific needs, Griffin said.



Wes Peterson, professor of agricultural economics at the University of Nebraska–Lincoln and a participant at the Kansas City Fed's Agricultural Symposium, said "Technological innovation is essential, both to feed people and protect the environment."

ENVIRONMENT POSES RISKS TO FUTURE AG PRODUCTION

Despite doing more with less, sector faces challenges

by SU BACON

Overall, the growth in agricultural productivity has been good for the environment.

"We're using less land and less water, and producing more," said Keith Fuglie, economist with the U.S. Department of Agriculture.

Although the population has more than doubled since 1950, the United States now uses about 25% less farmland.

"We are feeding far more people using fewer environmental resources," Fuglie said.

But has the environment been good for agricultural productivity?

"Despite tremendous gains in agricultural productivity, the sector remains as vulnerable to environmental factors as ever," said Wolfram Schlenker, professor at the School of International and Public Affairs and the Earth Institute of Columbia University.

Schlenker examined the influence of environmental factors — specifically extreme heat and ozone air pollution — on corn yields from 1980 to 2019. His paper, "Environmental Drivers of Agricultural Productivity Growth and Socioeconomic Spillovers," was presented at the Agricultural Symposium.

"Extreme heat and ozone pollution have led to the largest yield reductions — in some years, more than 20%," he said.

For corn, temperatures above 86 degrees Fahrenheit and ozone pollution greater than 70 parts per billion (ppb) are highly detrimental to yields.

"Peak ozone pollution in the United States repeatedly exceeded 3,300 parts per billion-hours in the 1980s," Schlenker said.

And yields fell accordingly.

The good news is that progress has been made.

Due to the success of the Clean Air Act, "almost all peak ozone pollution above 70 ppb has been eliminated over agricultural areas," he said.

Crops are still susceptible to ozone, but it doesn't affect year-to-year corn yields.

But warming remains.

"Temperatures in the United States have been trending mostly upward since 1980," Schlenker said.

He found that most of the country has seen warming in the last 40 years. If the warming continues, in the worst-case scenario, the hottest Dust Bowl year will become just an average year.

The projected increase in extreme heat by the end of the century is so large, in fact, that irrigation will become extremely costly and will not cool enough to offset extreme heat, he said.

Farmland in areas that already are hot may become so unproductive that it will be abandoned.

Moving growing areas north is one approach.

"The location of where crops are grown is changing," said Philip Pardey, professor in the Department of Applied Economics at the University of Minnesota.

"Illinois and Minnesota are big corn producers now," he said.

How will climate change affect the future of food and the feeding of a projected 9 billion people by 2050? Previously, global food supply grew faster than demand and real food prices fell significantly, alleviating hunger and poverty for hundreds of millions during the first half of the 20th century, Pardey said.

By 2050, global demand for food is expected to increase 70%.

Meeting the demand "will take larger increases in food production if at the same time, we want to reduce food insecurity from its current levels," said Wes Peterson, professor of agricultural economics at the University of Nebraska–Lincoln.

Food insecurity is defined by the United Nations as a chronic inability to procure enough food to be adequately nourished. Currently food insecurity averages 12-15% worldwide — affecting more than 925 million people, he said.

"Climate change is a major problem in many parts of the world," Peterson said.

For example, "in the Sahel region of Africa, it is not uncommon for farmers to harvest a crop only once every three or four years due to lack of rainfall," he said.

A food shortage can occur when not enough food is produced whether due to climate change or drought, floods and fire.

Although technology can't counteract such events, researchers are developing plant hybrids that are adapted to a variable climate.

"Technological innovation is essential, both to feed people and protect the environment," Peterson said. "It's going to take effort, research and awareness of the problem."

Seth Post, CGB Enterprises regional general manager, at the Consolidated Grain and Barge Co. terminal in Enid, Oklahoma. *Photo by David McNeese*

Businesses like Consolidated Grain and Barge Co. have adjusted to changes in how farmers store harvested crops. *Photo by David McNeese*

FARM PRODUCTION A KEY PART OF AG SUPPLY CHAINS

Productivity spillovers from one industry cause adjustments in other sectors

by SU BACON

Busy countryside grain elevators are a familiar sight during harvest in the Midwest as farmers haul crops from their fields to distant storage bins.

But that landscape is changing. Those rural elevators are beginning to disappear. Rather than storing their harvested crops off site, producers are increasingly keeping the grain on the farm.

"We are seeing more and more farmers putting up their own grain bins," said Seth Post, regional general manager for the Southwest Region of Consolidated Grain and Barge (CGB) Enterprises, a global grain and transportation firm. "We have had to adjust our approach as to how we handle the crops they produce," Post said.

Making such adjustments in one sector of the economy because of increased productivity in another sector is a "productivity spillover," said Sergio H. Lence.

Lence, a professor and Marlin Cole Chair of International Agricultural Economics in the Department of Economics at Iowa State University, has studied productivity spillovers along the agricultural supply chain. His paper with Alejandro Plastina, "An Empirical Investigation of Productivity Spillovers along the Agriculture Supply Chain," was presented at the Agricultural Symposium.

Lence investigated linkages between the agriculture sector and 62 other sectors of the U.S. economy, including industries involved in the complex agricultural supply chain such as rail and truck transportation and including food services and drinking establishments.

"Knowing the ways in which agricultural productivity affects, and is affected by, productivity in other sectors of the economy seems critical in designing better policies aimed at enhancing growth," Lence said.

Productivity is the reason on-farm grain bins are being built. As farms have become bigger due to consolidation, "the farmer has gotten more efficient in growing and harvesting a crop and the size and scopes of their operations have grown," Post said.

CGB turned its attention away from its countryside elevators to improving efficiency at export terminals where farmers with on-site bins take their crops directly.

In fact, the terminals have become so efficient that during harvest a grain terminal in Enid, Oklahoma, handles 700 to 800 trucks a day.

The process also has become streamlined for individual farmers who previously had to wait in long lines to weigh, unload and get a receipt.

"It used to be a laborious process," Post said. "But now, thanks to automation, the farmer never gets out of the truck."

For CGB and the farmer, the spillover was positive. But spillovers also can have negative effects.

"Nobody thinks about the supply chain until it doesn't work," said Heidi Schweizer, assistant professor and extension specialist at North Carolina State University. For example, supply chains were caught unprepared by the panic-buying of toilet paper and meat in the early stages of the COVID-19 pandemic. Supply simply wasn't adequate for the unexpected surge in demand.


High volumes of grain are transferred at Consolidated Grain and Barge Co. *Photo by David McNeese*

Additional delays were brought about by truck driver shortages, closed truck stops and other pandemic-related disruptions. Delays affecting truckers, in turn, affect those waiting on their deliveries.

"Every day a perishable product is on a truck is one day less on the grocer's shelf," Schweizer said.

Risk, a measure of the supply chain, depends upon the product.

"There's a lot more concern about risk with perishable products than with corn and soybeans," Schweizer said.

Because they need to be moved quickly, perishable products are transported by truck.

Agriculture depends heavily on highways. Schweizer cited a 2018 USDA report that showed 80% of all agricultural commodities traveled by highway.

Highway safety, congestion, infrastructure condition and roadway reliability are all factors influencing the speed at which commodities move from the field to a final destination.

Being less perishable than fresh produce, corn and soybeans can travel by rail although they may begin their journey on a truck.

"An American farmer's access to global markets depends upon the efficiency of the rail, roads and waterways within the U.S.," Post said.

As farmers have become more productive, the need to update infrastructure to handle the increase is crucial.

Considering that some 520 million bushels go directly to export through the inland river system, "our aging and in some cases, outdated lock systems continue to be a focal point for us," Post said.

With the widening of the Panama Canal to handle larger vessels and the continued interest in adding capacity in the Gulf, "Our ability to keep up with the farmer and the exporter will make improvements to this infrastructure critical in years to come."

Photo by Getty Images

RESEARCH DRIVES LONG-TERM AG PRODUCTIVITY GAINS

Sector, however, facing challenges after years of funding, innovation

by SU BACON

Twenty years ago, when Jason Warren drove on U.S. 412 from Enid to Stillwater, Oklahoma, he was surrounded by seemingly endless fields of wheat.

Today, "on the same stretch of road, I see as much soybean, sorghum and corn as wheat," he said.

Warren is an extension specialist in plant and soil sciences at Oklahoma State University. While motorists may enjoy the changing scenery, Warren knows why the view has changed.

Farmers are rotating their crops. They're planting varieties that thrive in that area. They're using farm management strategies, such as no-till planting, that improve productivity and profitability. It all started with research.

"U.S. agriculture is dependent on robust investments in research and development to raise productivity," said Keith Fuglie, an economist with the Structure, Technology and Productivity Branch in the Resource and Rural Economics Division of the U.S. Department of Agriculture.

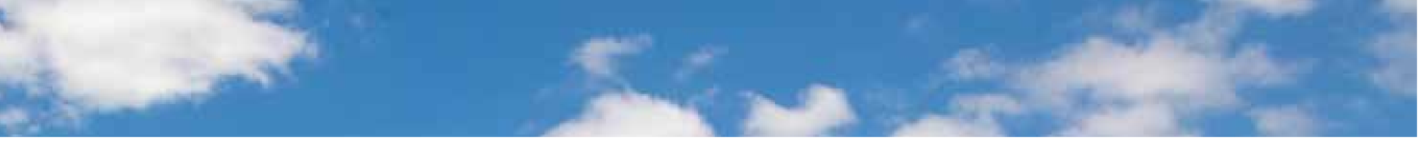
Warren's research someday may mean cotton will be added to the mix in the Oklahoma panhandle as an alternative to corn.

"It's an opportunity to generate revenue equivalent to corn with one-third the water," he said.

Extension specialists work with scientists at agricultural experiment stations, funded by state and federal dollars, at land-grant universities.

The federal-state partnership has helped drive agricultural productivity growth, Fuglie said. From World War II through the early 1980s, growth in public research and development expenditures was sharper than at any time since, he said.

Mechanical, biological, chemical and digital advances allowed farmers to become more efficient and productive — farming more acres with less labor, planting hardier varieties, watering selectively, and with precise application of fertilizer and chemicals.



But has U.S. agriculture's golden age of productivity growth ended?

Philip G. Pardey has investigated public and private funding for agricultural research and notes a marked decline since the late 1980s.

"Public agricultural R&D resources allocated to productivity-enhancing purposes have shrunk," he said.

In 20 years, Jason Warren, an extension specialist at Oklahoma State University, has seen farmers shift from wheat to soybeans, sorghum and corn. *Photo courtesy of Oklahoma State University*

Pardey is a professor in the Department of Applied Economics at the University of Minnesota. He and Julian M. Alston co-wrote "The Drivers of U.S. Agricultural Productivity Growth," which was presented at the Agricultural Symposium.

In 1960, the United States accounted for 20% of global investments in public agricultural research and development, Pardey said. In 2015, the U.S. share had dropped to 8.9% and China, India and Brazil together spent $3.16 for every U.S. dollar invested in public agricultural research and development.

"Over the last 15 years, private and public spending in agricultural research and development by China, India and Brazil has increased dramatically," said Thomas Coon, vice president of the Division of Agricultural Sciences and Natural Resources at Oklahoma State University.

Yet, at Oklahoma State funding for the agricultural experiment station has been cut by $8 million.

"We have fewer faculty today than six years ago," Coon said. "Where we once had eight or nine plant breeders, we have two now."

Federal funding has been stagnant, Coon said: "The dollars appropriated have remained the same for the last 25 years."

Coon compared federal dollars allocated for agriculture research and food — $2 billion a year — with $46 billion for the National Institutes of Health.

Consider the consequences, he suggested, if a virus comparable to COVID-19 hit U.S. livestock or crops: would current funding enable the U.S. to respond quickly enough?

Pardey cites lag time and pressure to study other areas as causing some of the decline in funds for agricultural productivity research.

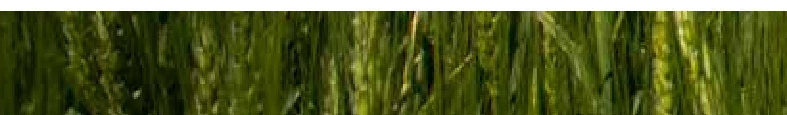
"While investments in agricultural research often have a high payoff, long time periods often elapse between the investment and the economic impact," Fuglie said.

It can take decades from a first study to real-world results, including breeding plants more resistant to heat and drought, and managing or eliminating pests and diseases.

Yet, attention gradually has turned away from such studies as research increasingly focuses on food safety and security, and environmental concerns, which have little effect on productivity, Pardey said.

The U.S., however, is still very advanced, Pardey said. But maintaining that leadership requires an investment in research and development to support past gains and move forward with new ones.

"Great potential exists for innovation in crop and livestock genetics and digital farming technologies to generate new products and production processes," Pardey said.



Ask an ECONOMIST

Nida Çakır Melek

The evolving link between oil prices and U.S. consumer spending

Research led by Kansas City Fed senior economist Nida Çakır Melek suggests that the response of U.S. consumption to oil price changes has become more muted. That analysis was detailed in a first quarter 2021 *Economic Review* article by Çakır Melek and Robert J. Vigfusson, assistant director of the Division of International Finance at the Board of Governors of the Federal Reserve System.

How have oil prices behaved recently?

Prices have fluctuated widely since the 1970s. Starting around 2000, oil prices steadily rose and reached historic highs in the mid-2000s. Then, in the wake of the 2007–09 global financial crisis, oil prices plummeted. They rebounded sharply in the early stages of the subsequent economic recovery. This rebound helped fuel investment in the U.S. oil sector and propelled the widespread use of fracking, a high-pressure hydraulic drilling method that breaks up shale to extract oil. As the fracking revolution took hold and U.S. oil production ramped up, prices again fell sharply in 2014. Although oil prices began to recover again in recent years, they took yet another sharp hit in the COVID-19 economic downturn. The changes in oil prices have implications for the economy. In this article, we focus on U.S. consumer spending.

How do oil price changes affect U.S. consumption? What has changed in this relationship?

Historically, consumers tended to increase spending on non-oil goods and services when oil prices fell. This is partly because consumers can spend less of their income on fuels and increase their spending on other goods and services, as demand for oil is relatively slow to adjust to price changes. In addition, lower oil prices would benefit a net oil importer country, because less of its income would be transferred abroad to pay for the same amount of oil imported. However, this response appears to have weakened more recently. First, the share of oil expenditures in households' budgets has fallen, even for lower-income households. Second, the domestic oil sector has grown strongly over the last decade. Consequently, the United States has become much less reliant on oil imports. As a result, oil price changes may no longer have the same effect on consumption.

Which aspects bear watching?

The increase in work from home during the pandemic and the potential for workplace flexibility after the pandemic might lead some individuals to redirect gasoline money toward other spending. Of course, this effect is distributional in that it would benefit only those who have the flexibility to work from home and not those tied to their workplaces. Therefore, a useful area of further research would be consumption behaviors across different groups. That might help us better understand the distributional effects of oil price changes in an evolving environment.

FURTHER RESOURCES

Read the complete *Economic Review* article at *KansasCityFed.org/research.*

SNAPSHOTS

Summaries of reports and analysis from Kansas City Fed economists and staff

Anchoring inflation expectations

by BRENT BUNDICK and A. LEE SMITH

The Federal Reserve's communication of a numerical objective for inflation better anchored longer-term inflation expectations but might have anchored them too low.

Economic Review, March 2021

Local projections, autocorrelation and efficiency

by AMAZE LUSOMPA

A more accurate estimator of causal effects might help economists better evaluate how monetary policy affects the economy.

Research Working Paper, March 2021

Farm lending remained muted in early 2021

by NATHAN KAUFFMAN and TY KREITMAN

A reduction in the volume of operating loans led to an overall decline in total non-real estate lending. Financing activity also declined more notably at banks with relatively large farm loan portfolios.

Ag Finance Update, First Quarter 2021

Moderate expansion for energy

by CHAD WILKERSON

Activity in the energy sector moved higher than year-ago levels for the first time since early 2019. Expectations indexes, including future drilling and business activity, also increased.

Tenth District Energy Survey, First Quarter 2021

Factory activity continues rise

by CHAD WILKERSON

Tenth District manufacturing activity expanded further, with the highest monthly composite reading in survey history, and expectations for future activity increased considerably.

Tenth District Manufacturing Survey, April 2021

See full reports, papers, data and more at KansasCityFed.org/research.

kcFED SOCIAL SEEN

Social media highlights across the region

1 **@KANSASCITYFED** If you were cheering on the @kscitymonarchs at their home opener tonight, you may have seen the honor guard in #KCFed's Law Enforcement team presenting the colors!

2 **@501TECHNET** met with Chad Wilkerson, #KCFed #OklahomaCity Branch Executive, to pick up decommissioned Bank laptops as part of the #EmployersLaptopChallenge. They will refurbish & redeploy them to @ReMergeOklahoma, @SunbeamOKC & @okgoodwill. Learn more: *bit.ly/3xNymvh*

3 **KANSASCITYFED** You're not seeing spots… just 2 cheetahs that #KCFed employee Jolyn P. photographed during her visit to the @OmahaZoo, another beautiful place in the Tenth District! #KCFedLife #PeopleAndPlacesOfTheTenth

4 **MSCHOCOLATEKISS72** Federal Reserve Bank of Kansas City…We had a day out at the Money Museum…They love it!!
kansascityfed What a great photo! We are glad you enjoyed your visit to our museum.

5 **JULIE MURPHREE** @Cottonaggie #kcfedag2021 In 1960, US was responsible for 20% of global investments in public agricultural research and development, (professor Philip G.) Pardey said…via @KansasCityFed

GET SOCIAL» *Find us on Instagram, LinkedIn, Pinterest, Twitter and YouTube to follow Kansas City Fed activities, share your photos and post feedback.*

Tenth District *by the numbers*

ECONOMIC INDICATORS, FACTS AND TRENDS FROM THE SEVEN STATES

5th

Ranking for Overland Park, Kansas, among 200 U.S. cities in a 2021 study of locations where women are most successful.

Sources: SmartAsset.com and U.S. Census Bureau

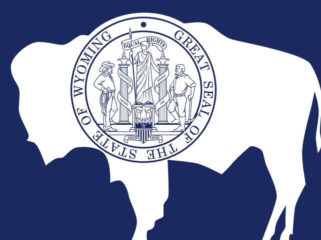
43.1%

Missouri's projected employment increase by 2022 in the "accommodation and food services" sector.

Source: Missouri Economic Research and Information Center

$64.6 million

Department of Energy research funding recently awarded to a carbon-capture project in Gillette, Wyoming.



Source: National Energy Technology Laboratory

64.4%

Colorado business leaders' confidence level at the end of Q1 2021, compared with 47.9% three months earlier.

Source: University of Colorado Boulder Leeds Business Confidence Index

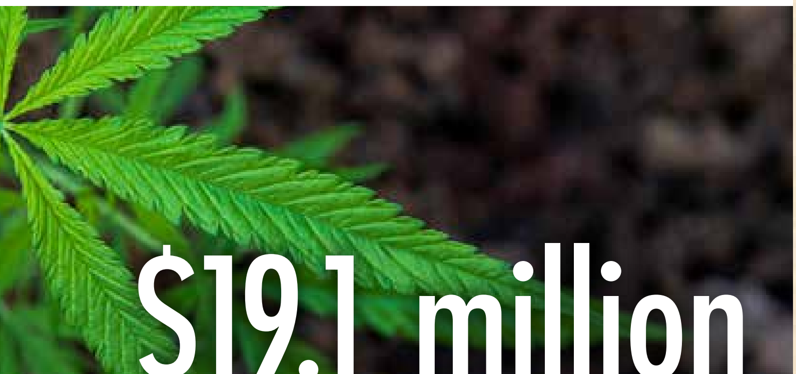
MORE ECONOMIC DATA

The Bank regularly publishes data about regional and national economic conditions at *KansasCityFed.org/research/indicatorsdata.*

4,981

Estimated population increase in Nebraska from July 2019 to July 2020, less than 1% and the slowest pace since 1989.

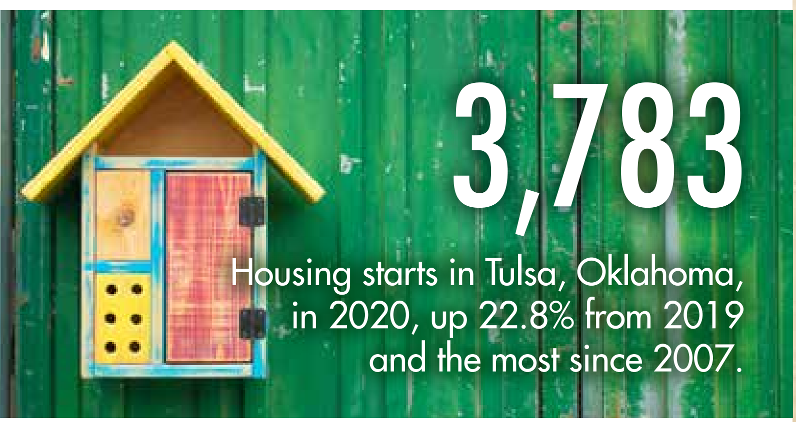
Source: U.S. Census Bureau



$19.1 million

Projected 2023 boost to New Mexico's general fund from the recent legalization of recreational cannabis sales.

Source: New Mexico Legislative Finance Committee



3,783

Housing starts in Tulsa, Oklahoma, in 2020, up 22.8% from 2019 and the most since 2007.

Source: Home Builders Association of Greater Tulsa

FROM THE VAULT

Kansas City Fed History

In 1930, a streetcar starts south up Main Street. *Courtesy of Missouri Valley Special Collections, Kansas City Public Library*

Echoes of streetcar era unearthed

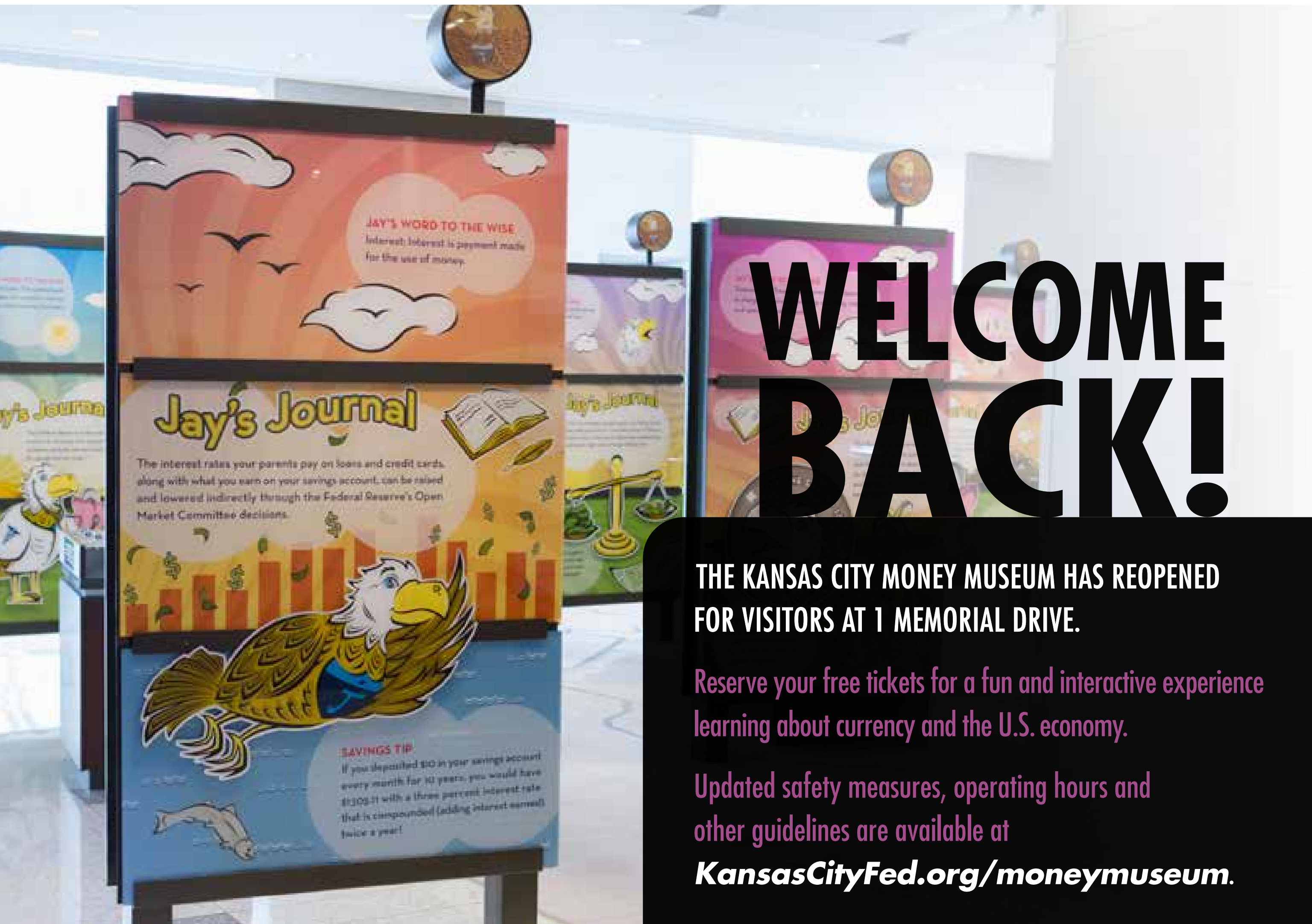
During recent work to expand the Kansas City Streetcar southward—a project that will restore streetcar traffic up Main Street past the Bank's headquarters—rails, cable pulleys and other structural implements from the city's old streetcar line were uncovered. The discovery ties the past to the future, underscoring the historical importance of the Bank's location.

The history of the land on which the Bank's head office sits—in the area of 29th and Main streets—is well-documented to 1821, when it was part of the Santa Fe Trail, then the country's main commercial highway. An early advance in local transportation began in 1869 with the founding of the Kansas City and Westport Horse Railroad Co., which created a horse car system to connect Kansas City with Westport, south of the Bank's current location. One of the founders was Milton Payne, a former Kansas City mayor who once owned the land where the Bank now stands.

Although the horse railroad company provided a public transportation option, it was unprofitable and didn't last long. By about 1911, the Metropolitan Street Railway Co. was working on an electric streetcar system. Tracks up the steep grade on Main Street between 24th and 27th streets were completed in 1919. Streetcars then ran along Main Street past the current bank location before being phased out in the late 1950s. The old rail lines were paved over and forgotten… until recently.

FEDERAL RESERVE BANK OF KANSAS CITY
1 Memorial Drive
Kansas City, Missouri 64198-0001

CHANGE SERVICE REQUESTED



WELCOME BACK!

THE KANSAS CITY MONEY MUSEUM HAS REOPENED FOR VISITORS AT 1 MEMORIAL DRIVE.

Reserve your free tickets for a fun and interactive experience learning about currency and the U.S. economy.

Updated safety measures, operating hours and other guidelines are available at ***KansasCityFed.org/moneymuseum***.