CHOICES

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Theme Overview: Rural Development Implications One Year after COVID-19

Jane Kolodinsky and Stephan J. Goetz

JEL Classifications: I15, O13, O18, Q1
Keywords: Agriculture, Investment needs, Recovery, Rural-urban differences

The COVID-19 pandemic has had far-reaching impacts on most sectors of the U.S. economy, and these impacts have been uneven across rural and urban areas. On the one hand, rural areas were already lagging behind urban areas in many sectors before the pandemic (Ajilore and Willingham, 2019; U.S. Department of Agriculture, 2018), including in terms of educational attainment, access to health care and broadband, and general economic progress (e.g., Dobis et al. 2020; Goetz, Partridge, and Stephens, 2018). On the other hand, lower rural population density and greater reliance on personal as opposed to public transportation likely reduced the rural populations' exposure to the virus (Goetz et al., 2020).

This special theme issue was commissioned by the Council on Food, Agriculture and Resource Economics (C-FARE) to examine how COVID-19 affected rural areas and prepared in collaboration with the Northeast Regional Center for Rural Development on behalf of the Regional Rural Development Centers (RRDCs). Mueller et al. (2021) find an urban bias for COVID-19 research and available data that overlooks 47 million people. The eight papers in this collection examine multiple impacts of the pandemic as well as the effects of selected federal policies designed to mitigate adverse impacts. The papers consider employment and job loss trends across rural and urban areas associated with the pandemic, the impacts on agriculture—including differences between crop and livestock farmers, and impacts on other specific sectors of the economy, including tourism, childcare, banking, and healthcare facilities. A final paper focuses on the critical role of broadband in providing educational and healthcare services during the pandemic. Most of the papers highlight economic development challenges faced by rural communities that were made clearer or exacerbated by the COVID-19 pandemic. To bounce back to pre-pandemic levels, public policy interventions will be needed beyond short-term emergency levels.

Articles in this Theme:

Cho, Lee and Winters compare trends in employment rates in rural and urban areas in 2020, finding that rural areas experienced overall smaller declines compared to urban areas, with their higher population densities, even as rural COVID-19 monthly infection rates started to exceed those in urban areas after August 2020. The authors report that, within rural areas, those with higher infection rates also experienced higher short-term employment losses. In particular, counties with above-median rates of infection saw an average employment loss of 3.6% compared to a loss of 2.1% in counties experiencing rates of infection below the median. The authors also suggest that lower vaccination rates because of greater skepticism in rural areas will reduce the speed with which employment is able to rebound.

The second and third papers in this issue examine differences in how the pandemic impacted livestock and crop farming. Giri, Peterson, and McDonald examine how the level of payments to farmers made under the Paycheck Protection Program (PPP) compared with actual farm expenditures on hired labor nationally. They find differences in the average cost of job retention for livestock versus crop farmers as well as notable differences across states. They also suggest that the PPP's impact was reduced in rural areas because of lower relative participation. Stevens and Bromley report that counties in Michigan, Wisconsin, and Minnesota with more livestock-intensive production were more adversely impacted than those in which crop farming was important because of the differences in labor intensity of production.

Brown, Basak-Smith, Bradley, Stearns, Morzillo and Park discuss the tremendous surge in interest in rural trail use associated with the COVID-19 pandemic. Documented immediate and longer-term increases in outdoor space use pose both challenges and opportunities for trail and environmental management, public health, economic asset development, equity, and access. The possibility that more rural people are engaging in physical activity on trails may be a positive sign for public health in rural communities affected by COVID-19. That said, while the number of users has increased, the distance traveled per user decreased. The paper raises so many yet-to-be-answered questions. Continued trail and use monitoring will be necessary to identify how resource allocation should best be managed and where additional resources will ensure continued recreational use as well as environmental preservation.

Davis, Tosum, and Warner-Richter discuss the childcare implications of COVID-19. Childcare provision as a critical infrastructure support to full employment in rural areas was already a topic of policy discussion before the pandemic (e.g., Schmidt, Goetz, and Tian, 2021). Facility closures impacted not only families of essential workers who had few other options but also families who had to home-school older children in addition to caring for younger children. In some cases, this caused a triple threat of needing to work, provide schooling for older children, and care for younger, preschool-aged family members. Prepandemic, 60% of rural households resided in "childcare deserts." With the possibility of now-closed facilities unable to remain solvent, there are clear implications for rural employment post-pandemic.

Cho and Rupasingha discuss the USDA's Community Facilities Programs (CF) funding to health facilities in rural communities and investigate the impact of the program on COVID-19 death rates in CF health-funded counties over 2016–2020. Pre-pandemic, of 116 U.S. counties without a medical clinic or hospital, 83% were located in nonmetro counties; 77% of counties without an intensive care unit were also in nonmetro counties. Clearly, the pandemic brought these statistics to the forefront, with negative impacts including higher death rates from COVID-19 in rural relative to urban areas. However, regardless of rurality, CF health-funded counties had statistically significantly lower COVID-19 case and death rates. As with other studies focused on policy impacts on rural populations, the authors conclude that attention must remain on policy solutions to health disparities in a post-pandemic society.

Litt highlights the increasing decline of bank branches during COVID-19, which began long before the pandemic. As with employment, health, and education, the pandemic has increased digitization of the banking industry, which accelerated due to the 2009 Dodd–Frank Act. The author concludes that the number of bank branch closures will continue to increase in coming years. We can expect rural communities to continue to be adversely impacted by bank closures precipitated by the COVID-19 pandemic since bank closures, even in crowded markets, are shown to decrease local credit supply as lender-specific relationships are hard to replace and alternative financial service providers like check cashing outlets, payday lenders, and other relatively high-priced services fill the financial void.

Whitacre presents a general picture of broadband progress in rural America prior to the COVID-19 pandemic, summarizes broadband-related legislation passed as part of the response, and highlights rural experiences with schooling and healthcare during the transition to a more online-dominant environment. It is not news that rural areas lag behind their urban counterparts in the availability and adoption of broadband, gaps commonly referred to as the rural–urban version of the "digital divide." The COVID-19 pandemic has both highlighted an on-going problem and provided crisis interventions: Providers have lowered cost and increased access, albeit not necessarily "in home." This had implications for increasing access to both school and (tele-) health care: Very few homes with school-age children reported having their Internet

service paid for by an outside source, and rural residents remained less likely to use telehealth. Post-pandemic, the work of both increasing access to in terms of building infrastructure and decreasing disparities in broadband use by rural residents will be necessary.

Overall, the eight papers in this issue suggest more severe impacts of the COVID-19 pandemic on rural compared to urban communities. Lack of infrastructure—including financial institutions and health care facilities, limited employment opportunities, and limited childcare access and affordability—all coexisted with a lack of broadband infrastructure even before the pandemic. The pandemic amplified the effects of this deficit, not only in education and medicine but also in terms of e-commerce. In the short term, public policy interventions on an emergency basis helped prevent the collapse of rural communities and their economies. However, a continued focus on longer-term policy solutions and public investments will be necessary. The fact that many rural communities may be uniquely vulnerable to the pandemic's physical and economic impacts implies that recovery plans will look very different from those designed for urban areas (Mueller et al., 2021). The papers in this issue provide some evidence of rural America's needs.

Current policy proposals by the Biden–Harris administration designed to "build back better" offer the prospect of redressing past rural investment neglect as well as the opportunity to take advantage of a renewed interest in rural America brought about by the pandemic.[1] Broadband access for 100% of Americans is clearly outlined, as is an increase in the number of community health centers. President Biden's discretionary fund specifically points to rural economic development, including for farmers and ranchers, and environmental protection in addition to broadband initiatives (U.S. Department of Agriculture, 2021). Attention to agriculture as a component of rural revitalization is critical. But it also includes opportunities to rebuild communities with newly increased population caused by pandemic-induced urban to rural migration.

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[1] See https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/31/fact-sheet-the-american-jobs-plan/.

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Lost and Found? Job Loss and Recovery in Rural America during COVID-19

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JEL Classifications: J2, R2
Keywords: COVID-19, Employment, Recovery, Rural

COVID-19 disrupted economic activity throughout the United States in 2020. The employment losses were less severe in rural areas than in urban areas (Cho, Lee, and Winters, 2020a,b). Both rural and urban areas experienced partial employment recovery in subsequent months but were still significantly worse off through December 2020 than before the pandemic (Figure 1).

Infection Rates Explain Differing Employment Impacts between Rural and Urban Areas

The larger early employment losses in urban areas than rural areas were driven by their higher initial COVID-19 infection rates (Cho, Lee, and Winters, 2020a). The pandemic recession was driven by individuals and firms altering their behavior to mitigate their own exposure to the virus (Chetty et al., 2020). The fear and uncertainty created by the virus is the primary cause of employment losses during the pandemic (Goolsbee and Syverson, 2020). Rural areas had lower initial infection rates and less motivation for people and businesses to alter their economic behavior (Figure 2). However, the lower COVID-19 infection rates in rural areas did not last. Rural areas surpassed urban areas in new infection rates in August 2020 and had persistently higher rates through December 2020. Further, both rural and urban areas experienced rapid increases in infection rates during the last three months of 2020.

The rapid rise in infections during the latter months of 2020 stalled the economic recovery. Rural employment recovered significantly during the first few months after April 2020 and had almost fully recovered by July 2020. The recovery was partially driven by adaptations such as working from home, wearing personal protective equipment, and dining outdoors at restaurants. Additionally, the initial plunge in employment was driven by uncertainty about the risks involved in various activities. As knowledge about the virus improved, some people felt more confident in resuming economic activity, which helped facilitate the initial economic recovery. However, the resumption of some economic activities may have contributed to rising infection rates. Rising infection rates caused a resurgence in rural job losses and prevented further economic recovery. Year-over-year employment changes for rural areas in November 2020 were the worst they had been since May 2020, and December 2020 saw minimal recovery.

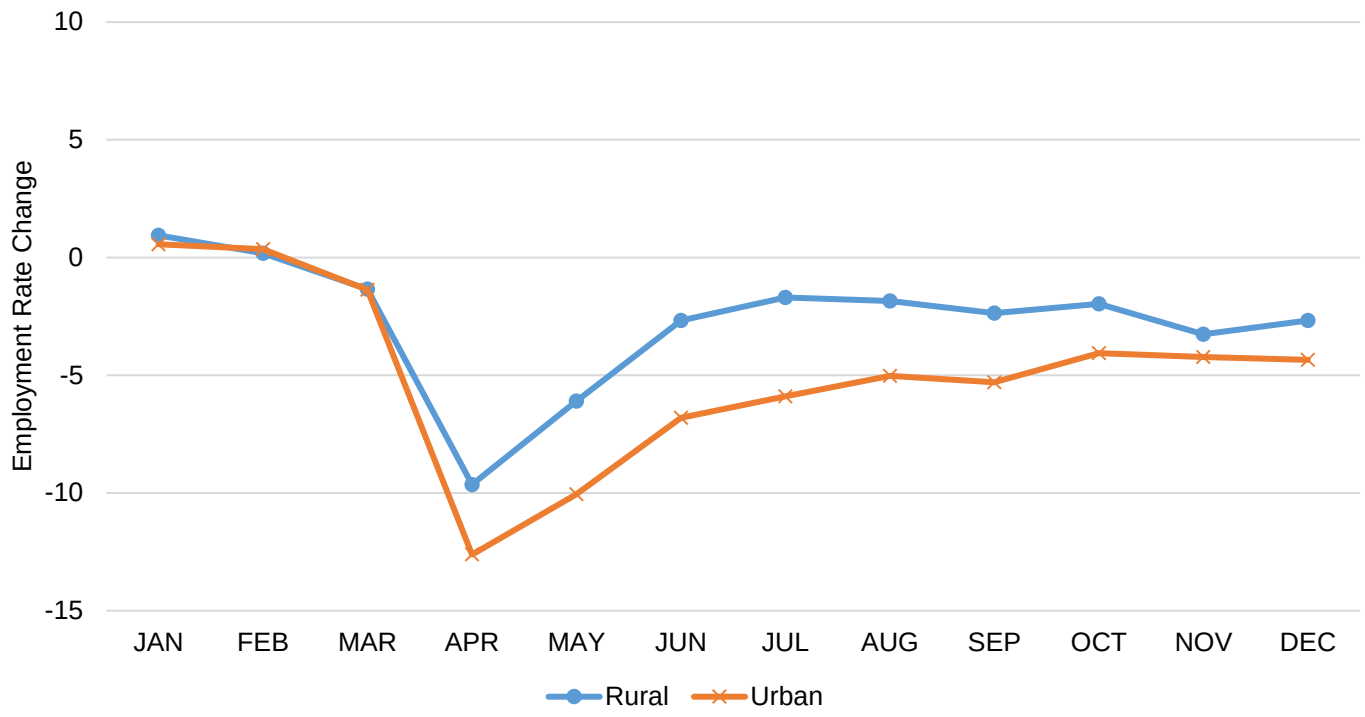
Other Factors Matter Less

The local industrial structure also somewhat affected employment outcomes during the pandemic. For example, leisure and hospitality was very hard hit while agricultural employment was relatively stable. Leisure and hospitality employment is more concentrated in urban areas, and agriculture is concentrated in rural areas. However, industrial structure is not the primary factor explaining differential rural and urban employment impacts (Cho, Lee, and Winters, 2020a). Differences in individual characteristics like age, education, gender, and race are also not the primary factor. State policies mandating business closures are also not a primary cause (Goolsbee and Syverson, 2020).

Impacts Vary across Rural Areas

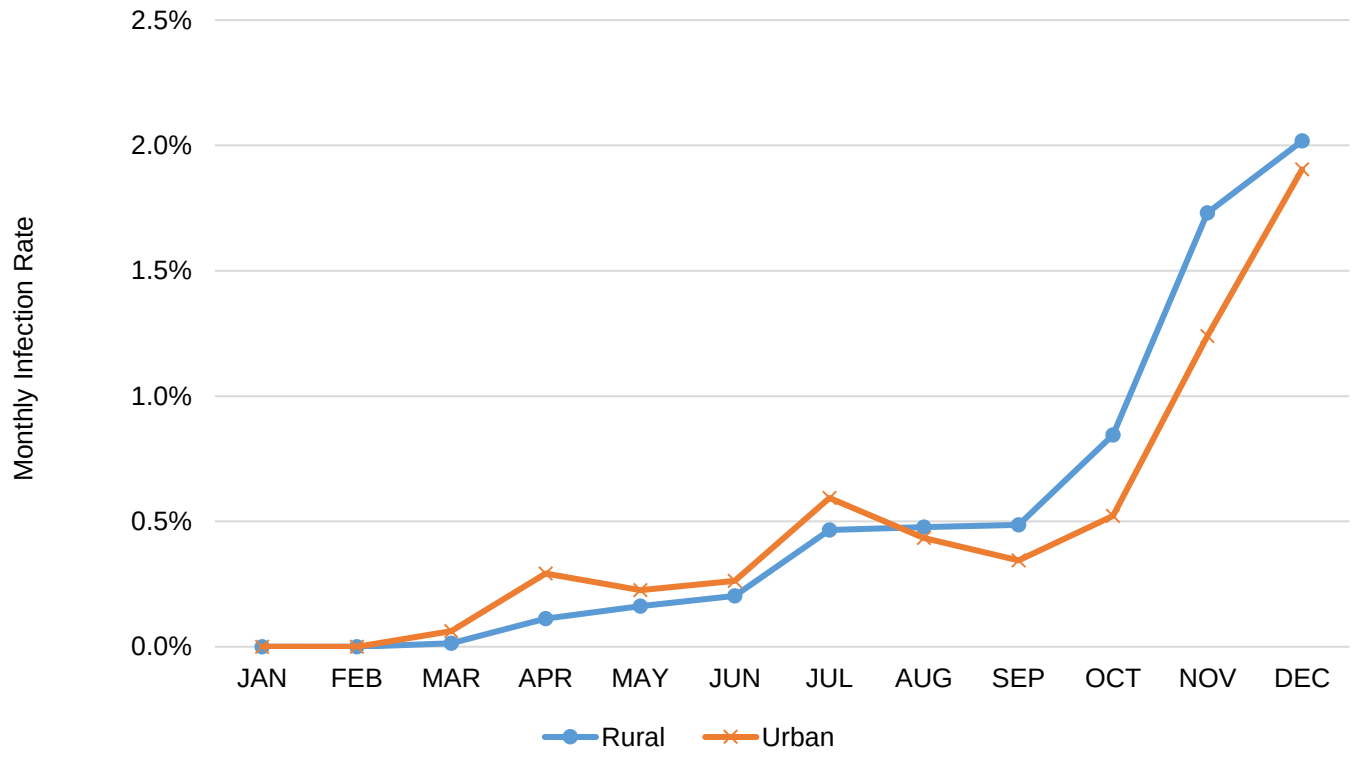
There are also differing employment impacts across rural areas. For November–December 2020, rural areas with COVID-19 infection rates above the median had larger year-over-year employment rate decreases than those with infection rates below the median (Figure 3). Thus, rural areas with higher COVID-19 infection rates have worse employment outcomes. Additionally, the oil and gas industry and rural areas heavily reliant on the industry have been especially adversely affected by reduced demand for travel during the pandemic. There is also anecdotal evidence that some high amenity rural areas have done relatively well, especially during the summer of 2020, as people sought vacations in remote areas.

Figure 1. 2019-2020 Employment Rate Changes by Month for Rural and Urban Areas



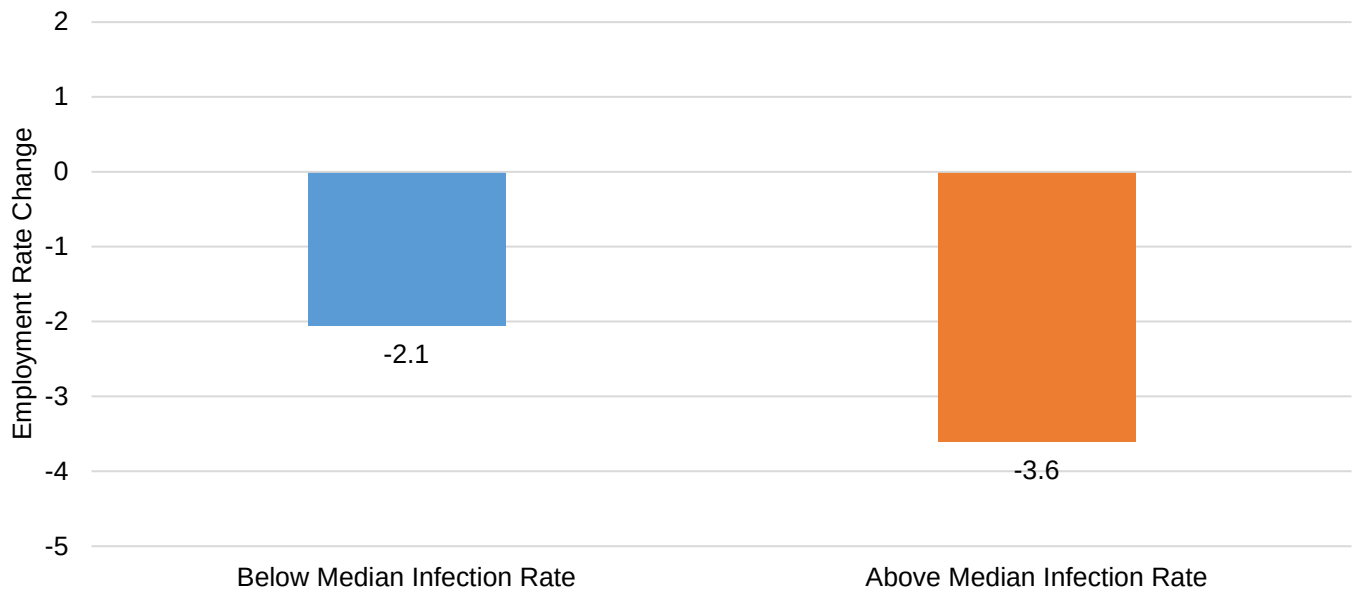
Note: Rural areas are defined to include all nonmetropolitan counties; urban areas include all metropolitan counties.
Source: Authors' estimates based on the U.S. Current Population Survey.

Figure 2. Monthly Infection Rates for Rural and Urban Areas



Note: Rural areas are defined to include all nonmetropolitan counties; urban areas include all metropolitan counties.
Source: Authors' estimates based on USAFacts (2020).

Figure 3. Rural Employment Losses Are Greater in Places with Above-Median COVID-19 Infection Rates



Source: Authors' estimates based on the U.S. Current Population Survey.

Vaccinations Are Key

The evidence suggests that rural employment will not fully recover until the pandemic is contained. Vaccinations will hopefully play an important role in ending the pandemic and restoring employment to prepandemic levels. However, some individuals are reluctant to receive the vaccine, and this appears especially relevant for some rural areas due to less trust of government and greater individualism (Fisher et al. 2020; Kirzinger, Muñana, and Brodie 2021; Nguyen et al. 2021). Low vaccination rates may cause the virus to drag on instead of ending quickly.

The Pandemic Will Have Lasting Impacts

Even after much of the U.S. population is vaccinated, lower vaccination rates around the world may continue to impede international travel and tourism and hinder oil industry employment recovery. Conversely, many businesses and workers with favorable experiences with remote work during the pandemic may view it as a good option going forward, which may increase employment opportunities for rural residents and increase the desirability of rural residence for more workers in a variety of industries. Of course, high-speed Internet is a critical input in working from home, and many rural areas still have limited access.

Additional Research Results

We also conducted additional analysis with results reported in Cho, Lee, and Winters (2020a). There, we document that there were large differences in pandemic employment impacts by metropolitan area population size. Specifically, larger metropolitan areas suffered worse employment reductions than smaller metropolitan areas during the early months of the pandemic and large differences persisted in subsequent months.

In Cho, Lee, and Winters (2020a), we also use statistical analysis to examine the potential role of various factors in explaining differences in employment losses across areas. We find that local COVID-19 infection rates are a major factor explaining employment differences across areas. Areas with higher infection rates experienced larger employment reductions. The higher early infection rates in urban areas also had persistent adverse effects on employment. This may suggest that some individuals and businesses in urban areas viewed COVID-19 as a more serious risk than those in rural areas and altered their behavior more in urban areas than in rural areas, perhaps even after rural infection rates exceeded urban infection rates.

The local industrial structure also affects pandemic employment impacts across areas. The leisure and hospitality industry experienced especially severe employment reductions. Areas heavily concentrated in leisure and hospitality were very hard hit. Urban areas had somewhat higher leisure and hospitality employment concentrations than rural areas, so this explains some of the differing overall employment impacts between rural and urban areas, especially during the early months of the pandemic. Additionally, the agriculture sector was relatively stable during the pandemic compared to other industries, and rural areas have greater employment concentration in agriculture, which has overall helped stabilize rural employment. However, oil, gas, and coal industry employment is also more concentrated in rural

areas and was hard hit during the pandemic. Industry mix is overall not the predominant factor explaining differing employment impacts across rural and urban areas (Cho, Lee, and Winters 2020a).

We present evidence in Cho, Lee, and Winters (2020a) that state policy responses such as mandated business closures are not a predominant factor driving employment decreases during the pandemic. This result is also corroborated by other researchers (Chetty et al., 2020; Goolsbee and Syverson, 2020).

Individual characteristics such as age, education, gender, race, and ethnicity are important factors explaining an individual's likelihood of employment. However, we find in Cho, Lee, and Winters (2020a) that individual characteristics on the whole explain relatively little of the differing pandemic employment impacts across areas. For example, urban areas have higher percentages of college graduates and higher percentages of racial minorities than rural areas. College graduates have smaller reductions in employment rates than nongraduates, but racial minorities have larger employment rate reductions than whites. On the whole, these and other individual differences between rural and urban areas have largely offsetting effects on employment impacts. Thus, the differences in job losses between rural and urban areas are not driven by differences in individual characteristics.

Methods and Data Details

Our employment data are based on individual-level records from the U.S. Current Population Survey (CPS). The CPS is the data source the Bureau of Labor Statistics uses to compute the official unemployment rate and labor force participation rate for the United States. The pandemic increased unemployment, reduced labor force participation, and increased the prevalence of persons with jobs being temporarily absent from work (Cho, Lee, and Winters, 2020a,b). Looking only at the unemployment rate would understate employment losses because it does not incorporate labor force withdrawal and temporary employment absences. To incorporate all these adverse effects into a single measure of employment changes, we focus on the percentage of individuals (ages 16 and older) who are employed and at work as our employment rate measure; persons who are working remotely from home are included as employed and at work. To account for seasonality, we focus on year-over-year changes by calendar month. For example, we compare the employment rate in April 2020 to April 2019 and December 2020 to December 2019.

We define metropolitan areas as urban and nonmetropolitan areas as rural. The CPS reports whether individuals live in a metropolitan area or a nonmetropolitan area. We are unable to identify individuals' place of work or whether they commute between rural and urban areas. We also cannot identify the specific county for rural residents; the CPS only reports an individual's state and that they live in a nonmetropolitan area.

We obtained COVID-19 infection data from USAFacts (2020). We compute the total number of infections in rural and urban areas by calendar month and divide by their population to compute the percentage of COVID-19 confirmed infections by month.

We examined differences in employment rate decreases across rural areas by COVID-19 infection rates in November and December 2020. Specifically, we classified rural areas into those above and below the median infection rate for rural areas in November–December. We then computed average employment rate decreases for November and December 2020 for those above and below the median infection rate. We use two months instead of one to increase sample sizes and smooth out sampling variation.

Concluding Remarks

The COVID-19 pandemic caused major job losses in Spring 2020. Rural employment largely recovered during the summer but subsequently plateaued and even regressed as rural infection rates climbed during the latter months of 2020. By December 2020 the rural employment rate was still significantly below the previous year. Rural employment losses are higher in areas with higher COVID-19 infection rates. Controlling the virus is critical for restoring employment to prepandemic levels.

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Impact of the Paycheck Protection Program on U.S. Producers

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JEL Classifications: Q18, Q10
Keywords: Farm operations, Labor cost, Paycheck Protection Program

Introduction

In response to the COVID-19 pandemic, the U.S. government implemented multiple assistance and stimulus packages to aid consumers and businesses, including agricultural producers. Agricultural operations qualified for assistance from three relief programs in 2020: The Coronavirus Food Assistance Programs (CFAP 1 and CFAP 2) are targeted exclusively at agricultural producers and include direct payments to eligible operations. With some exceptions, producers of agricultural commodities (crop, livestock, dairy, or aquaculture) for which prices declined by 5% or more were eligible for a CFAP payment (Johansson et al., 2020). Some commodities (such as hemp, alfalfa mustard, etc.), for which price data were not available, were also eligible for payments under CFAP (Johansson et al., 2020). A third program for which agricultural producers qualified was the Paycheck Protection Program (PPP) administered by the Small Business Administration (SBA). The PPP was designed to help small businesses keep employees on the payroll and offset some of their operating costs. The maximum loan amount, which was forgivable if used during the 24-week period following the first disbursement of the loan on eligible expenses (payroll and allowed overhead expenses), was 2.5 times the monthly average profit plus payroll costs, including eligible overhead costs (employer insurance payments, employer unemployment taxes, etc.) (SBA, 2020). PPP data on each of the loans, including agricultural businesses loans, were released on December 1, 2020. This article examines the PPP participation rate, the average amount received, and PPP distributions relative to labor cost at the state level for the agriculture sector.

Government Support Programs

U.S. agricultural producers rely on the USDA for grants and other government payments administered under the Farm Bill. Ad hoc programs—such as the Market Facilitation Program (MFP), which provided direct payments to producers in response to retaliatory tariffs, and CFAP—are also administered by the USDA. Other federal departments and agencies were responsible for managing other ad hoc support programs created to provide assistance to compensate for losses caused by the pandemic. The 2021 Omnibus Appropriations Bill, which the U.S. Congress passed in December 2020 and President Trump signed into law, renewed the PPP, adding almost $300 billion; small businesses, including agricultural businesses, started applying and receiving loans in 2021. The 2021 American Rescue Plan (ARP) Act also includes an additional $50 billion for continued PPP loans.

Family farms accounted for more than 98% of all farms in 2019 (Whitt, Todd, and MacDonald, 2020). Because such farms play an important role in rural economies, the PPP program had and will continue to have a substantial impact on the economic wellbeing of rural America. Better understanding of various aspects of the PPP loans can provide lessons for the design and implementation of future programs aimed at supporting small businesses in general and rural farm businesses in particular.

Analysis of PPP Loans to Agricultural Producers

We use data at the PPP participant level from the SBA, along with microdata from the Agricultural Resource Management Survey (ARMS) and USDA's state-level employment data from the Farm Income and Wealth data product for our analysis. ARMS, administered annually by the National Agricultural Statistics Service (NASS) and the Economic Research Service (ERS), is the most comprehensive source of data on economic variables related to the farm sector, including labor expenses. The data released by the SBA provide information on the loan size and number of jobs retained. However, the SBA data alone do not provide any information on the impact of PPP loans on producers. Data on labor expenses from ARMS and farm income and wealth statistics (U.S. Department of Agriculture, 2020b) help connect SBA data to labor expenses to gain meaningful insights. Ideally, 2020

ARMS data, which collects information on participating farm operations for the year 2020, would show the impact of PPP on producers. The most recent ARMS data, however, are from the 2019 ARMS and, therefore, we use these data to provide a benchmark for the analysis.

Data released by the SBA show that more than $525 billion in PPP payments were disbursed through more than 5.2 million loans in 2020. Based on the 2019 ARMS data, 72% of all commercial farm operations had either positive net income or positive payroll expenditures, and therefore would meet the two most important requirements for eligibility to apply for PPP loans. Individual SBA loan data show that almost 121,000 (17% of eligible farm operations based on ARMS data) applied for a total of $5.9 billion in PPP loans (Table 1). SBA reports an average loan amount of $48,517.

Table 1 shows that crop farm operations applied for PPP loans at a higher rate (21% of eligible farm operations) compared to livestock farms (12% of those eligible). Of the total $5.9 billion in PPP loans, $2.1 billion (35%) went to livestock operations, and the remaining $3.8 billion (65%) of total loans went to crop operations. The number of employees paid by PPP loans in the crop sector (501,310) is more than twice that of the livestock sector (235,141). This is most likely because for many crop operations, labor cost as a share of total gross farm income is higher than for many livestock operations (U.S. Department of Agriculture, 2020a).

The major objective of the PPP was to allow employers who applied for and received the loan to pay employees by covering payroll expenses. Producers without employees but with positive net income were provided with funds to cover their income (in this case, their net returns, which are defined and counted as income by sole proprietors). A business had to use at least 60% of the loan amount for payroll expenses in order to receive full loan forgiveness in the 24-week period after receiving the PPP loan.

No information on the proportion of the PPP loans used for payroll expenses, as opposed to the amounts used for other authorized spending, is available. To compare the loan amounts to payroll expenses, we consider an upper bound (entire loan used for payroll) and a lower bound (60% of the loan used for payroll). Neither bound is exact, as more likely than not farm businesses used between 60% and 100% of the loan volume for payroll expenses but the bounds provide insights into annual payroll expenses relative to total PPP loan.

Funds from the PPP loans had to be disbursed within 24 weeks of receiving the loan, largely to allow greater flexibility in planning and use of funds. Table 2 shows that the disbursed PPP loans amounted to 22% of total annual hired labor expenses for the farm sector so if all loans were used to on hired labor wages, they would

Table 1. Distribution of the PPP Loans in the Agriculture Sector

Farm Type	Total Eligible Farm Operations	Number (and Percent) of Farm Operations That Applied for PPP	Total PPP Loan ($millions)	Total Reported Jobs
Livestock	320,135	39,545 (12%)	2,058	235,141
Crops	377,695	81,300 (21%)	3,805	501,310
Total	697,830	120,845 (17%)	5,863	736,451

Source: Data on eligible farm operations come from the 2019 ARMS. Remaining data are from the SBA.

Table 2. Labor Expenses and PPP Loans for all Farm Businesses

Farm Type	Total Annual Hired Labor Expense ($millions)	Total PPP Loan ($millions)	Share of Hired Labor Expense Covered	60% of the PPP ($millions)	Share of Hired Labor Covered by 60% of PPP
Livestock	7,932	2,058	26%	1,235	16%
Crops	19,243	3,805	20%	2,283	12%
Total	27,175	5,863	22%	3,518	13%

Source: USDA, Economic Research Service calculations using 2019 ARMS and the SBA data.

cover slightly more than 2.6 months of the year (2.6/12 months = 22%). Operations in the livestock sector would cover 26%, or slightly more than 3 months of labor expenses, while those in the crop sector would cover 20% (about 2.4 months). It is important to note that not all farms qualified and not all farms that qualified applied, as stated above, and the labor costs are for all farm operations.

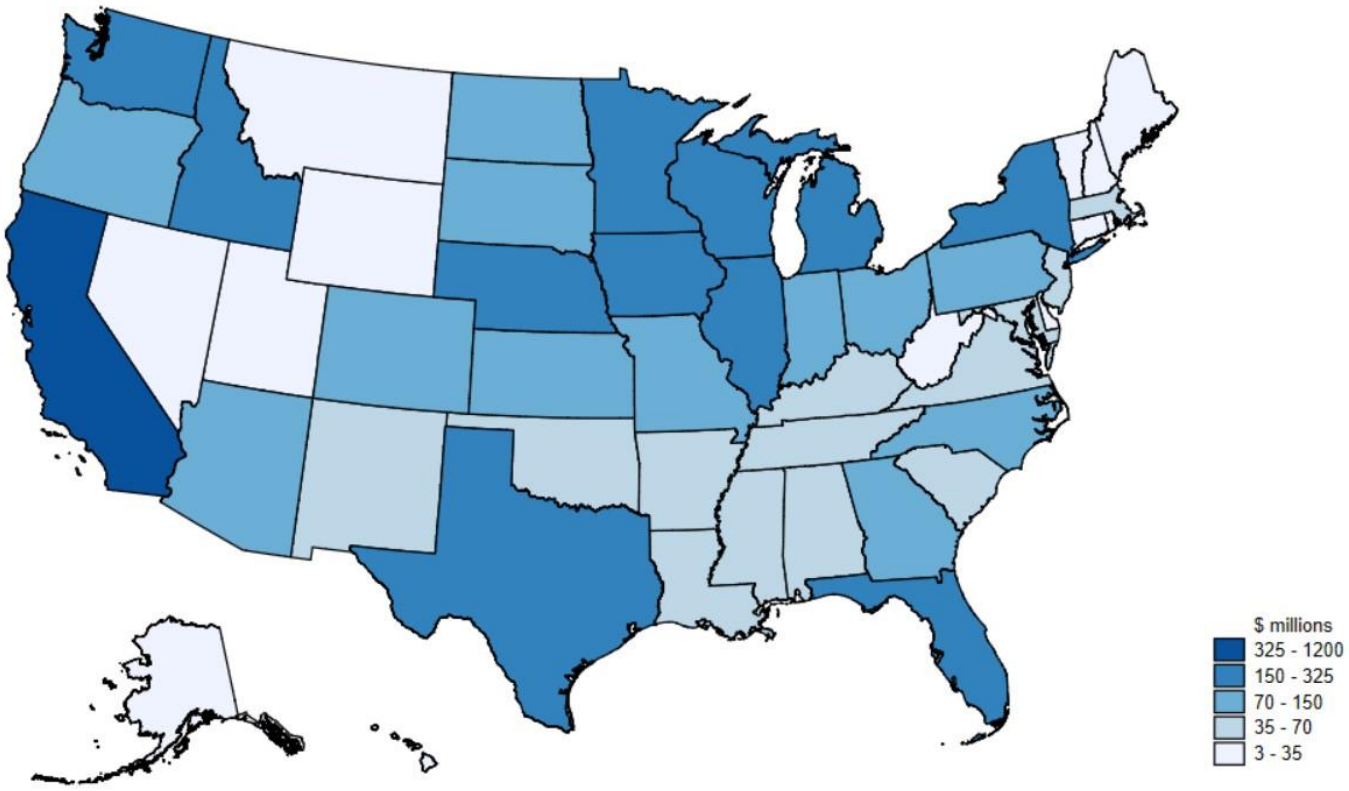
If farm operations were to use only 60% of the PPP loans on hired labor expenses, the minimum required to receive full forgiveness of the PPP loan, this would offset 13% of the labor expenses, or about 1.6 months of payroll expenditures (Table 2). Loans to the livestock sector applied exclusively to wages would cover 16%, or almost 2 months of labor expenses, while loans to the crops sector would cover 12%, about 1.5 months (Table 2).

Three limitations of these results should be noted: 1) We do not factor in profit or net returns that are allowed by the PPP, 2) labor expenses are not uniform throughout the year and therefore may not match up with the 24-week window targeted by PPP, and 3) we assume that all loans will be forgiven. The third limitation is a significant one that could change the results. We do not know yet whether the forgiveness conditions have been met since the SBA has not released any data on PPP loan forgiveness. If PPP recipient farm operations do not meet loan forgiveness criteria and have to return some money, it will affect the number of months the PPP loans covered, the jobs retained, and the labor costs they offset. Further, changes in the labor situation after receiving the loan could also affect the results. For instance, a farm employee leaving work after the farm operator has received the PPP loan would change the payroll cost thereby changing the results. The number of jobs retained are self-reported numbers by the PPP applicants. The exact number of jobs retained will be known after the loan forgiveness information is available. Because the lenders are still processing new loans, it is unlikely that data on forgiveness will be available in the near term. The analyses and results in this paper should be interpreted as preliminary, intended to provide insights into the impact of the PPP on U.S. producers. Many producers claim the net returns to the farm enterprise as family income at the end of the year. This analysis does not include these net returns. Finally, since not all eligible farm operations applied for the PPP loans, some farms will not have been able to offset any hired labor expenses.

Distribution of PPP Loans for Agricultural Operations across the United States

The largest loan total of $1.2 billion was made to California producers (Figure 1). The highest average loan ($170,745) was made to California producers and

Figure 1. Total PPP Loans for the Agricultural Sector per State



Source: SBA

the lowest average loan ($19,931) was received by South Dakota producers. This is expected as California had the highest average hired labor expense ($193,165) and highest average net farm income ($256,953) based on the 2019 ARMS data. Further, the contribution of Californian producers to total U.S. cash receipts was highest, at $53 billion (13% of total cash receipts) (U.S. Department of Agriculture, 2020b). The lowest total loan amount ($3.9 million) was made to producers in Alaska. This is also an expected result as the contribution of Alaskan producers to the total cash receipts was only $61 million (less than 1% of total cash receipts) (U.S. Department of Agriculture, 2020b).

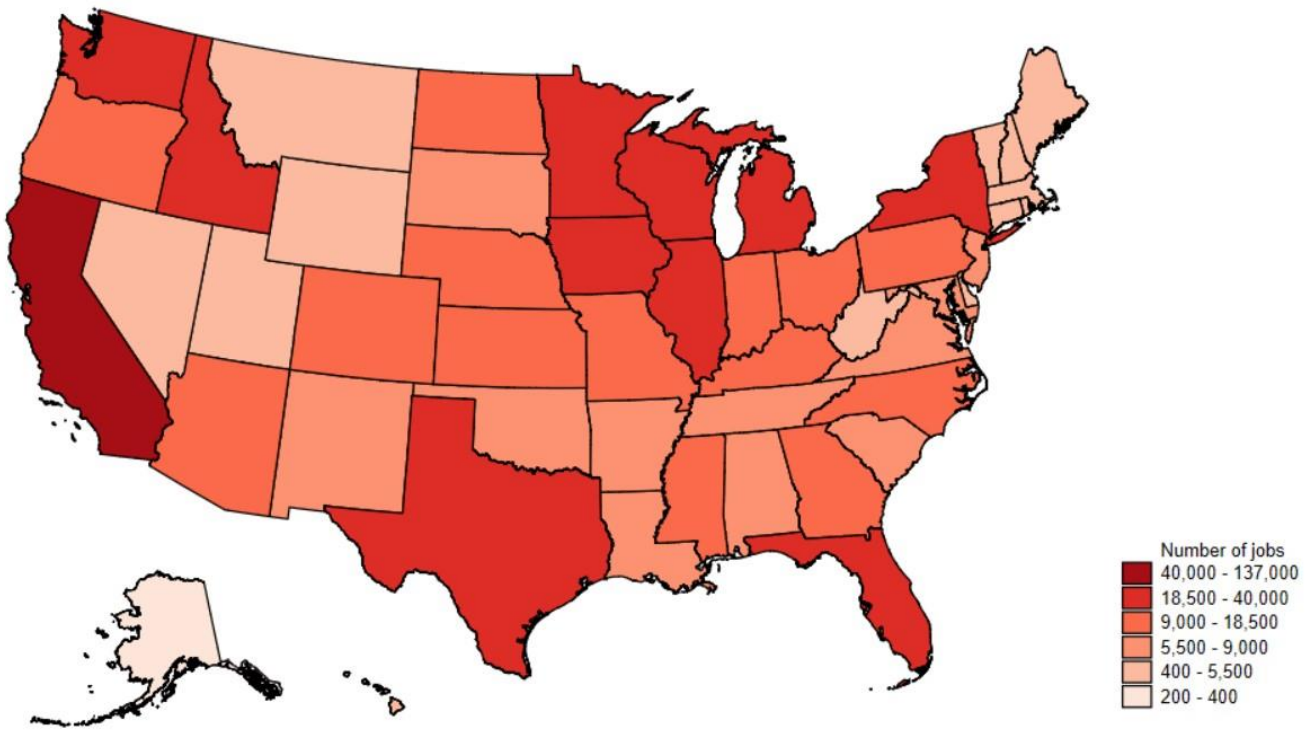
Based on data provided by the SBA, the maximum number of agricultural jobs retained, 136,692, were those of California workers and the lowest number, 396, were retained in Alaska. Figure 2 shows the total number of agricultural jobs retained in each state. In addition to California, Washington, Oregon, Texas, and Florida are among the states with the highest job retention. These states are part of what the Economic Research Service calls the “Fruitful Rim” (Heimlich, 2000), which is characterized by production specialized in fruit, vegetables, and cotton, which are relatively labor intensive compared with other crop production. The Heartland and parts of the Northern Crescent also realized higher-than-average total job retention. These states make up the Midwest and Upper Midwest and are specialized in cash grains and dairy production.

Figure 3 shows the share of total annual hired labor expenses represented by 60% of the PPP loan totals at the state level. We use 60% of the PPP loan totals since loan forgiveness was predicated on 60% of each loan going to labor expenses. Some states with relatively high labor costs—like California, Washington, and Florida—were among those with the lowest PPP loans as a share of total labor expenses. Generally, states with relatively high PPP loans as a share of hired labor expenses were those with the lowest total annual labor expenses. However, there is no clear pattern: Missouri received the highest PPP loans as a share of hired labor expenses but had the 15th lowest labor expenses for 2019.

Based on our calculations, only 17% of farm operations participated in the PPP. Figure 4 shows the participation rate across states, calculated as the number of participants divided by the number of eligible farms (farm operations with positive net income or positive payroll). The participation rate varies widely, from 88% in Idaho to 3% in West Virginia. The average loan size for Idaho producers was $96,159 and for West Virginia producers it was $39,194.

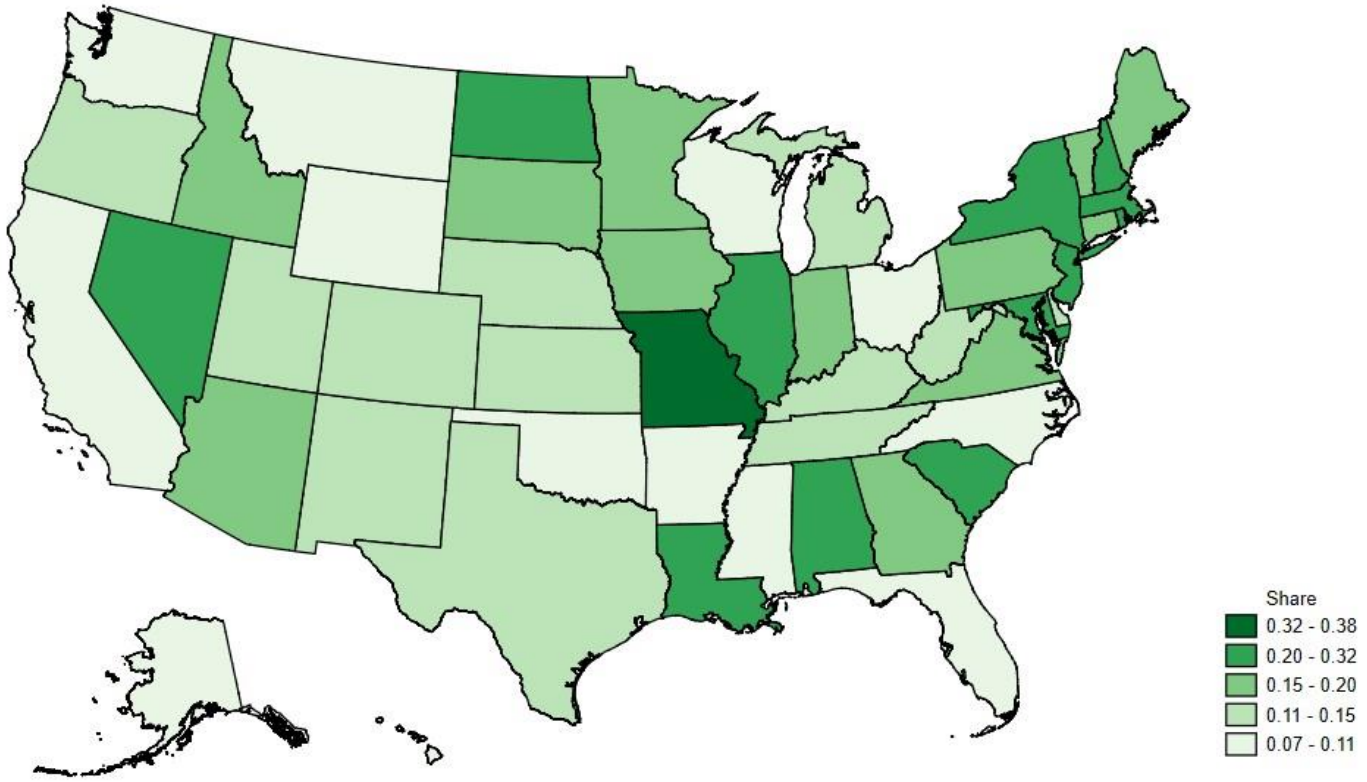
There is considerable geographic variation in the participation rates. In addition to Idaho, high participation rates are clustered in the Heartland and Northern Great Plains regions, which specialize in cash grains, wheat, cattle and sheep production. Participation rates were lower in Texas, New Mexico, and states comprising the

Figure 2. Total agricultural employees supported by the PPP loans per state



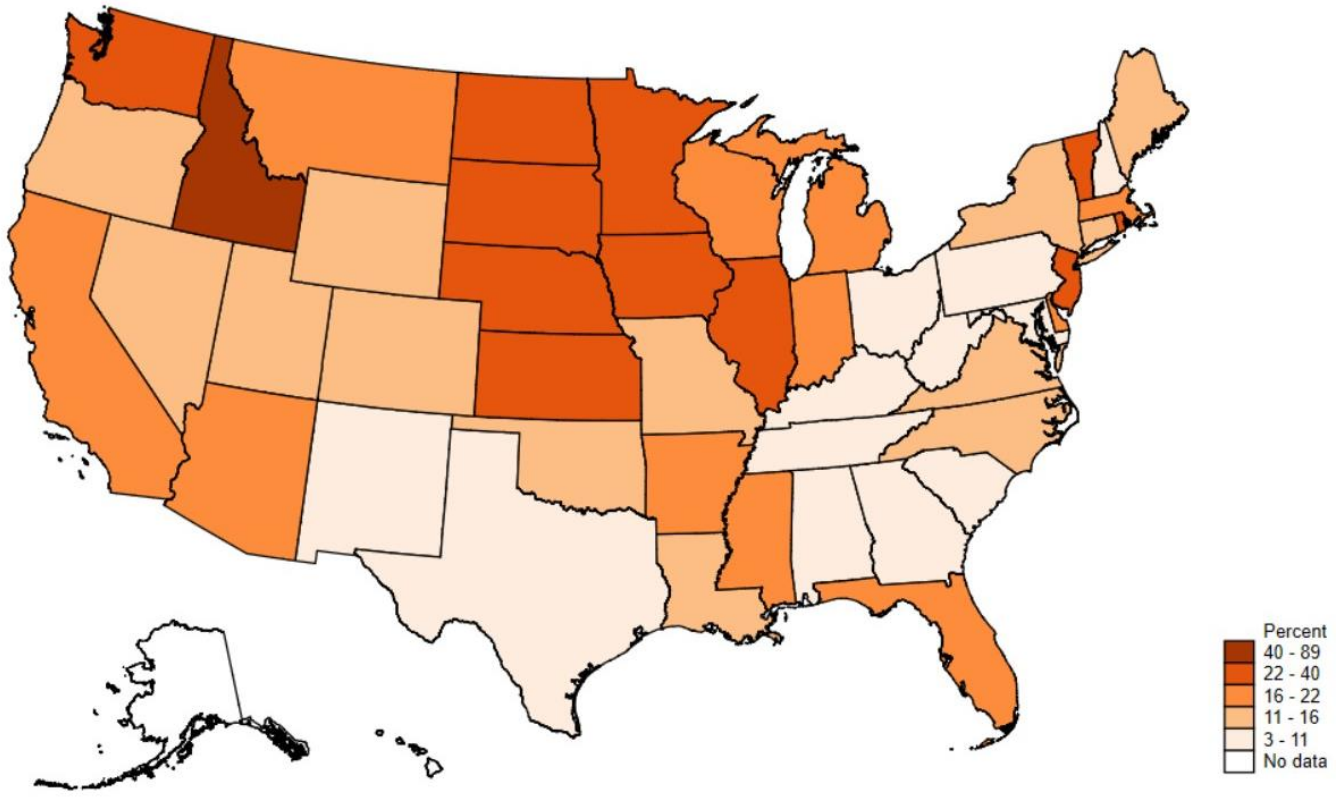
Source: SBA

Figure 3. PPP Loan Amounts as a Share of Total Labor Expenses



Source: SBA and U.S. Department of Agriculture (2020b).

Figure 4. Participation Rate of Eligible Agricultural Producers in the PPP Program by State



Source: SBA and U.S. Department of Agriculture (2020b).

Southern Seaboard. Data on the number of eligible farms were not available for Hawaii and Alaska.

Conclusion

It appears that the PPP program helped to pay a significant number of employees in the agricultural sector and contributed to the general economic well-being of rural America. However, the participation rate of eligible producers was fairly low, most likely because the PPP program was a new program and was administered by a different agency than the usual contact agency with which farmers are familiar (USDA). There were only about 121,000 applications for the PPP program, which is significantly lower than the number of applications for the USDA administered CFAP even though both programs are new ad hoc programs designed to provide aid to those affected by the pandemic. As of the end of 2020, there were 652,201 and 880,971 approved applications for CFAP 1 and CFAP 2 programs, respectively, showing a significantly higher participation rate for programs administered by the USDA. It is important to note that the requirements for the two programs, PPP and CFAP, were different.

If all eligible farm operations had applied for the PPP loans, at the average loan amount based on data from SBA, farm operations would have received $35.7 billion compared to the $5.9 billion actually received. Since the PPP program has been renewed in the new relief program and there are additional funds, simply increasing the participation rate would provide more relief to the agricultural sector and rural America in general. Based on the SBA (2021) announcement, the first draw of the PPP loans will be for borrowers who have not previously received a PPP loan.

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Rural Counties That Rely on Dairy and Animal Agriculture Saw Higher Unemployment Rates due to COVID-19

Andrew W. Stevens and Daniel W. Bromley

JEL Classifications: J64, Q10, R10
Keywords: Animal agriculture, COVID-19, Crops, Dairy, Rural, Unemployment

The year 2020 will be remembered for several striking events. Perhaps most notably, the COVID-19 pandemic has produced a severe shock to the economy. The famous influenza outbreak of 1918–1919 killed an estimated 675,000 Americans and led to a 1.5% drop in GDP. In comparison, the 2020 pandemic has already resulted in more than 500,000 deaths and a 3.5% drop in GDP—the largest one-year plunge since recordkeeping began after World War II.

The documented unemployment rate in the United States rose from 3.5% in February 2020 to 14.7% in April 2020, with serious consequences for the agricultural sector (Peña-Lévano, Burney, and Adams, 2020). At the outset of 2021, an estimated 10–12 million unemployed individuals remained. Most of these workers held low-wage jobs in the service sector, which accounts for approximately 80% of total employment, reinforcing long-run trends in economic inequality.

Much of the emphasis on the persistent unemployment due to COVID-19 has focused on urban bars and restaurants devastated by stay-at-home orders, social distancing requirements, and the large number of office staff now working remotely from home. The customer base for these businesses has disappeared. Unfortunately, comparatively little is known about rural unemployment. We seek to better understand how the COVID-19 pandemic has impacted rural unemployment in agriculturally dependent communities.

Even though COVID-19 has impacted employment numbers in the services sector more heavily than in the agricultural production sector (Peña-Lévano, Burney, and Adams, 2020), the pandemic certainly hit rural counties hard. Figure 1 shows the year-over-year change in the unemployment rate for nonmetropolitan counties in Michigan, Minnesota, and Wisconsin from September 2019 to September 2020. In some counties, unemployment increased by over 7 percentage points. In other areas, however, unemployment actually decreased by a small amount.

Regional patterns in these unemployment numbers suggest that some of the variation may be explained by differences in the agricultural economy of each county. It may be the case, for example, that row-crop operations are more insulated from the labor market than are dairy operations. If that is the case, policy makers concerned about rural unemployment will need to pay close attention to the structure of a county's agricultural sector to understand how insulated the community may be from future sustained shocks to the labor market.

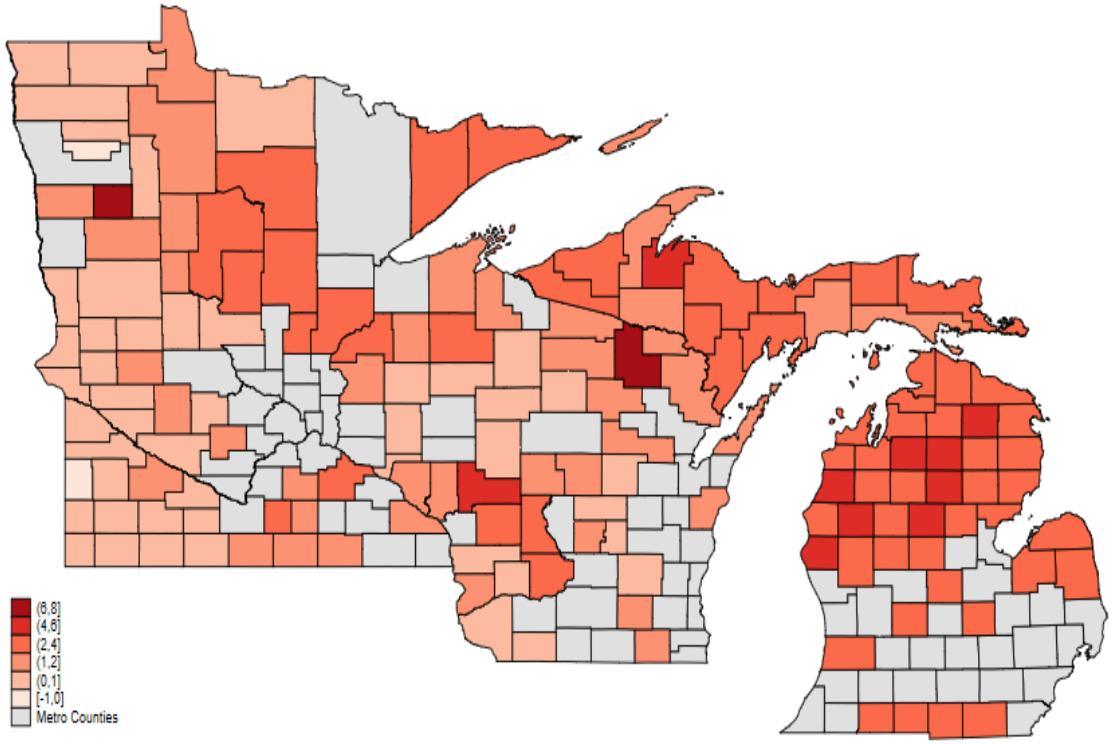
In this article, we explore how the composition of a county's agricultural sector affects the unemployment impacts the county suffered due to COVID-19. More generally, our research sheds light on whether and how counties with more labor-intensive agricultural sectors are at greater risk from shocks to the broader labor market. Our findings suggest rural communities that rely heavily on hired agricultural or food processing labor will require more robust public safety nets to deal with future crises compared to communities with less labor-intensive agricultural sectors. This research contributes to a small but growing literature exploring how COVID-19 has impacted the labor market in the agricultural sector and food system more broadly (Charlton and Castillo, 2021; Malone, Schaefer, and Wu, 2021; Luckstead, Nayga, and Snell, 2021).

Our Approach

Sample: Non-Metro Counties in Michigan, Minnesota, and Wisconsin

We analyze states that are similar enough to be compared with each other but that also contain a wide range of different types of agriculture. Our sample focuses on counties in Michigan, Minnesota, and Wisconsin. These three states are similar in many ways, but their agricultural sectors differ significantly. Michigan is known among the Midwestern states for its specialty crops, Minnesota relies more on row crops (e.g., corn and soybeans), and Wisconsin describes itself as America's Dairyland. As a result of these differences, the

Figure 1. Year-Over-Year Change in Unemployment Rate for Nonmetro Counties in Michigan, Minnesota, and Wisconsin, September 2020



Source: U.S. Bureau of Labor Statistics (2020).

agricultural sectors across these three states vary widely in the amount of hired labor they require. The more hired labor a farm requires, the greater the potential for layoffs (and resulting unemployment) before the entire operation is forced to fold.

Within our three states, we focus on only rural counties. Because the COVID-19 pandemic affected people across the economy, we focus on counties where unemployment in the agricultural sector would be least obscured by other industries. We therefore exclude any counties deemed metro by the Office of Management and Budget (U.S. Department of Agriculture, 2013). These excluded counties are shaded grey in Figure 1. Note that many metro counties nonetheless contain a lot of agricultural activity. For example, in Wisconsin, we omit counties around Green Bay, which have the greatest concentration of dairy cows in the state. This may mute the power of our analysis with respect to dairy, but we believe it leaves us with conservative estimates that are more cleanly separated from other sectors of the economy (like manufacturing or meat processing). We are left with 160 rural counties for our analysis.

Unemployment Data

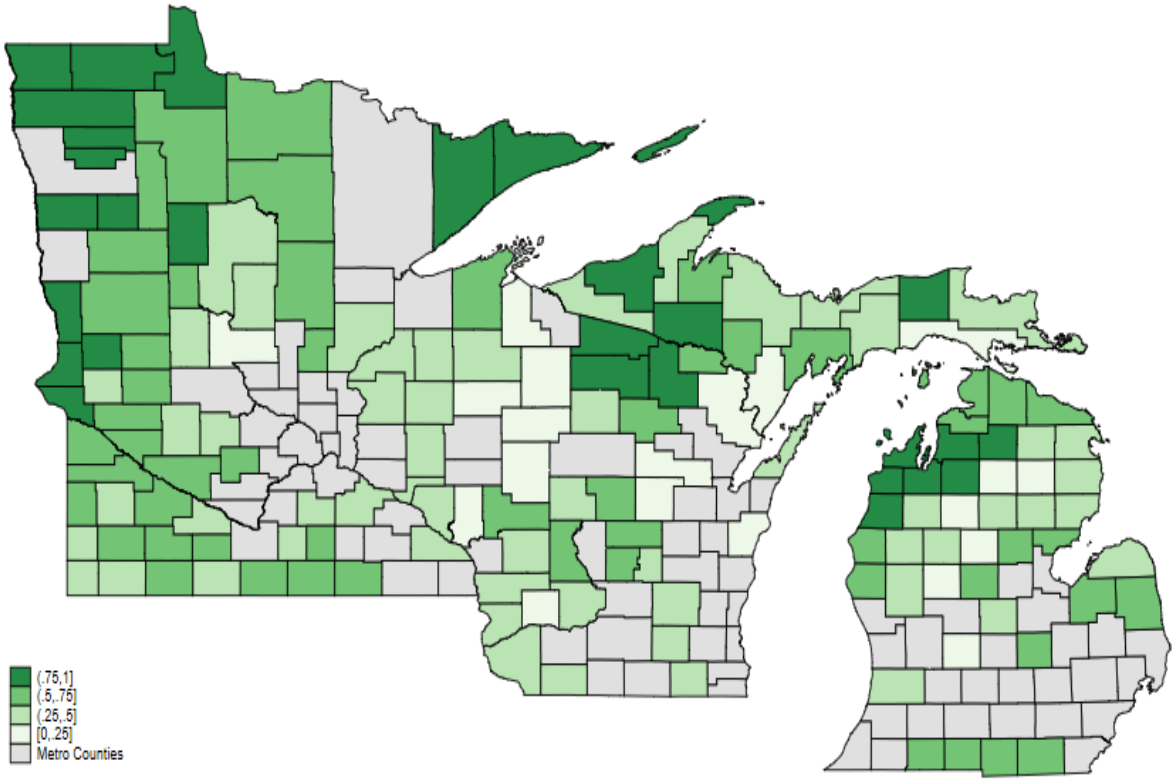
We analyze monthly county-level unemployment data from January 2010 through October 2020 from the Local Area Unemployment Statistics program at the U.S. Bureau of Labor Statistics (2020).

Agricultural Data

To characterize each county's agricultural sector, we utilize county-level data from the 2017 Census of Agriculture (U.S. Department of Agriculture, 2017). We define total agricultural sales (measured in dollars) as the sum of crop sales and animal sales. Crop sales includes both row-crop and specialty-crop sales. Animal sales includes all livestock, poultry, dairy, and other animal-based agricultural sales. Dairy sales were measured by milk sales.

For purposes of clarification, suppose that—according to the Census of Agriculture—a county has $600 million in crop sales, $200 million in animal sales, and $100 million in milk sales. Recalling that milk sales are part of animal sales, we would conclude that this county has a crop-sales share of 0.75 ($600 million/$800 million), an animal-sales share of 0.25 ($200 million/$800 million), and a dairy-sales share of 0.125 ($100 million/$800 million).

Figure 2. Relative Importance of Crops for Nonmetro Counties in Michigan, Minnesota, and Wisconsin (county crop sales as proportion of total agricultural sales)



Source: 2017 USDA Census of Agriculture, authors' calculations.

Among rural counties in Michigan, Minnesota, and Wisconsin, we see a wide range of agricultural composition. Figure 2 displays the geographic distribution of counties' crop-sales share: In some counties, crop sales represent less than 20% of all agricultural sales. In others, crop sales account for almost all the county's agricultural sales. On average, crop sales account for around half of agricultural sales in our sample. Note that the animal-sales share is defined as the complement of crop-sales share, so Figure 2 also implicitly maps counties' animal-sales share. Figure 3 displays the geographic distribution of counties' milk-sales share: We see counties in Wisconsin and northern Michigan more dependent on dairy than counties in Minnesota.

Statistical Analysis

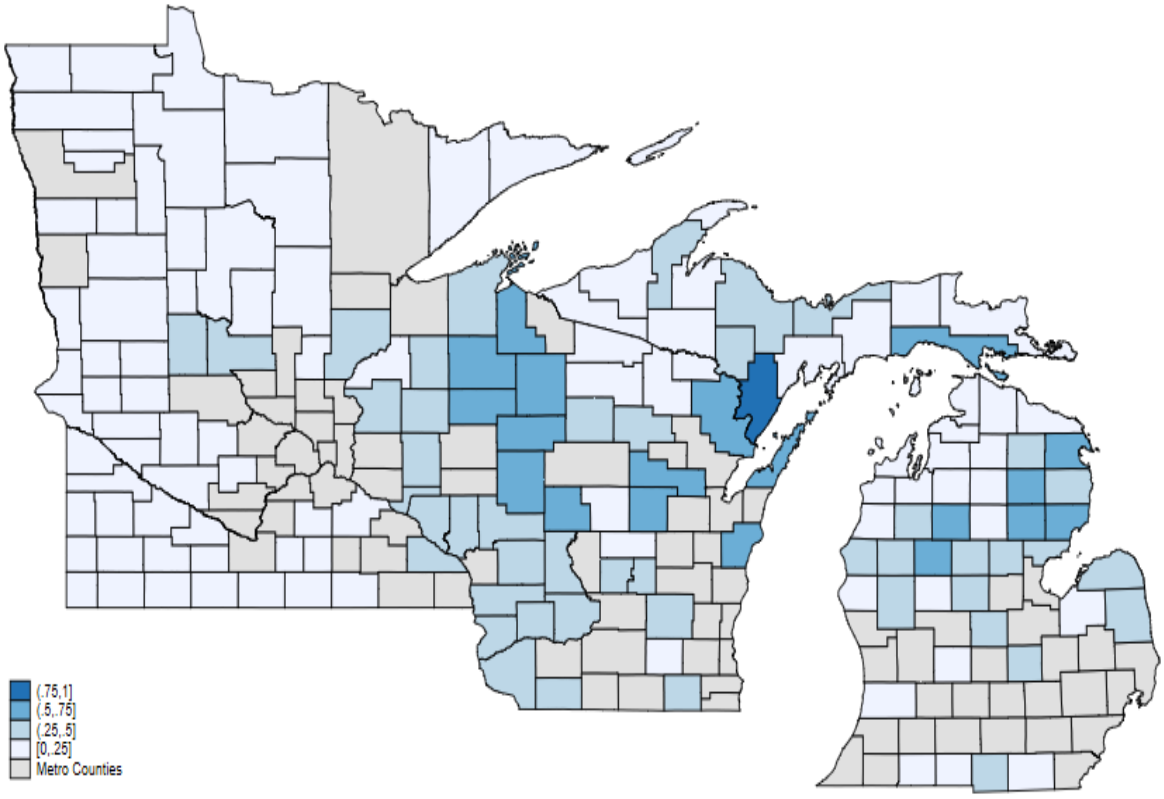
We analyze how the COVID-19 pandemic differentially affected unemployment rates in rural counties that are dependent on crops compared to those that are more dependent on animal agriculture or dairy. We accomplish this by using a method called difference-in-differences.

Our difference-in-differences approach evaluates each county's unemployment rate over time. The first "difference" in the difference-in differences model compares unemployment rates before the start of COVID-19 to unemployment rates after the start of COVID-19. The second "difference" compares counties that are more reliant on dairy (for instance) to counties that are less reliant on dairy.

To see how this works, consider a simple example. Suppose County A is 100% reliant on dairy and County B is 0% reliant on dairy. Further suppose that before COVID-19, both County A and County B had an average unemployment rate of 6%. After the start of COVID-19, County A had an average unemployment rate of 13%, while County B had an average unemployment rate of 11%. The difference-in-differences estimate is (13% – 6%) – (11% – 6%) = 2%. That is, we would conclude that a county being completely reliant on dairy caused the unemployment rate due to COVID-19 to be 2 percentage points higher than a county that did not rely on dairy at all.

In our analysis, we define the COVID-19 pandemic as beginning in April 2020 and extending through the end of our sample in October 2020. On average, the unemployment rate in our 160 rural counties increased by around 6% during the pandemic compared to the period between January 2010 and March 2020. We use the difference-in-differences method to explore how

Figure 3. Relative Importance of Dairy for Nonmetro Counties in Michigan, Minnesota, and Wisconsin (county milk sales as proportion of total agricultural sales)



Source: 2017 USDA Census of Agriculture, authors' calculations.

counties with relatively more reliance on different products (crops, animals, and dairy) compared to that average.

One concern with our approach is that it may not account for the many other factors that contribute to the unemployment rate in rural counties. We address this by including several sets of fixed effects to control for time trends, seasonality, and county-specific differences. In short, fixed effects capture information that is constant across our sample in different dimensions. For example, suppose that the unemployment rate in County C is always roughly 2 percentage points higher than the average unemployment rate in our sample. County fixed effects control for this persistent difference. The strength of our fixed effects approach is that we do not need to understand *why* there may be a persistent difference between counties (or years, or months of the year); the fixed effects simply capture this unobserved variation without us needing to fully explain it.

Using various levels of fixed effects, we account for long-term trends in unemployment rates, annual seasonality in unemployment rates, and pervasive differences in individual counties' unemployment rates.

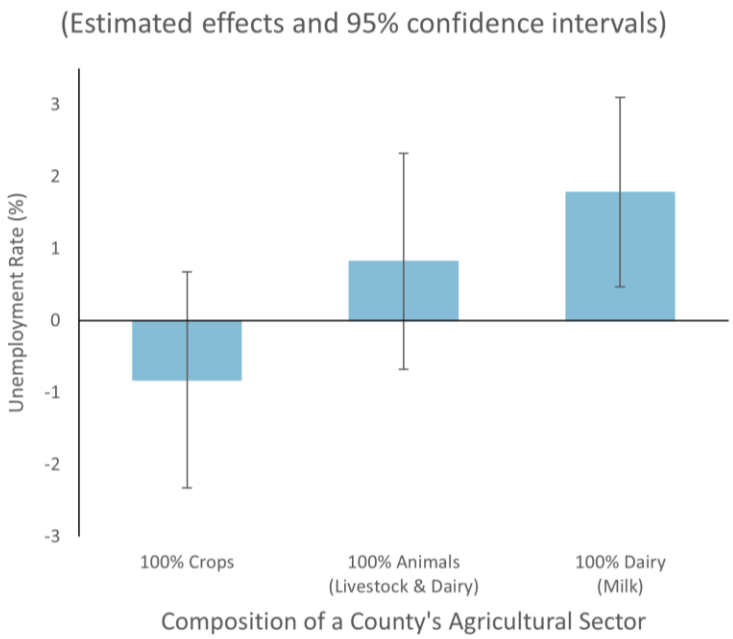
What We Find

Our results suggest that rural counties in Michigan, Minnesota, and Wisconsin that are more reliant on dairy and animal agriculture have experienced higher unemployment rates during the COVID-19 pandemic than counties that are more reliant on crops. This makes intuitive sense because dairy and livestock operations tend to be more labor intensive than crop-based operations.

Figure 4 displays the results of our analytical work. In this figure, the blue bars show how different we would expect the unemployment rate to be for a county whose agricultural sales were either 100% from crops, 100% from animals, or 100% from dairy. We would expect the unemployment rate to be about 0.8 percentage points lower for a county with 100% crop agriculture, about 0.8 percentage points higher for a county with 100% animal agriculture, and about 1.8 percentage points higher for a county with 100% dairy agriculture.

The effects in Figure 4 should be interpreted *relative to the average* unemployment rate due to COVID-19. Recall from above that counties in our sample experienced a roughly 6% increase in unemployment due to COVID-19. Consequently, our results suggest

Figure 4. How a County's Agricultural Composition Affected COVID-19 Related Unemployment



Source: Author's calculations.

that a county that relies completely on crop-based agriculture would have seen a 5.2% increase in unemployment due to COVID-19, while a county that relies completely on dairy would have seen a 7.8% increase in unemployment due to COVID-19.

The vertical lines in the center of each bar in Figure 4 represent 95% confidence intervals. Note that our estimated effects for counties with crop- and animal-based agricultural sectors are not statistically significant at the 95% level. However, our result for dairy-based counties is statistically significant (the bar extends beyond the vertical line). While our results would likely be more precisely estimated if we had a larger sample size, our findings are consistent with economic theory and our knowledge of the industry.

Conclusion

One of the most important economic trends over the past several decades has been the hollowing out of many rural economies. Small companies are closing or moving away. Schools, libraries, health clinics, and even hospitals face financial difficulties. The opioid pandemic has devastated many rural communities. These economic stresses are also correlated with increased political fragmentation.

The COVID-19 pandemic has compounded these stresses as we see mask wearing and calls for social distancing being resisted—even denounced—in some rural places. When workers in meat-packing plants became infected over the summer, the disease spread within their immediate families and to nursing homes and health centers where their spouses were employed. Local deaths spiked in several rural counties. Many infected workers, unable to go without a paycheck and frightened about their immigration status, felt forced to continue on the job.

These are difficult times in rural America, and they will continue to challenge citizens and policy makers alike. External shocks such as the COVID-19 pandemic rarely trigger large-scale economic shifts. Rather, they tend to reinforce pressures and tendencies that are already underway (Bartik et al., 2020).

Our findings here offer an early hint that difficulties across the rural countryside are likely to persist and may be concentrated in areas that are more dependent on hired labor. The key element in that consideration is to what extent rural employment, whether directly in agriculture, or in the rural towns that depend on agriculture, can recover to prepandemic levels (Barrero, Bloom, and Davis, 2020).

We note that the greatest job losses have been in areas more reliant on animal agriculture—especially in dairying. This makes some intuitive sense: Operations that hire laborers (like many animal and dairy farms) can lay them off, while operations that are run exclusively by owner-operators (like some row-crop farms) will only contribute to unemployment figures if the farm shuts down entirely. There are already labor pressures in the dairy sector. Recent hostility to immigrant workers, often the major source of labor on dairy farms, has driven many workers to repatriate south of the Mexican border and beyond. The resulting inability to find local labor is

pushing many dairies to consider mechanization—a move that necessarily entails larger units to pay for expensive automated milking. One pressure point pushes another, which then pushes another (Hennessey and Feng, 2018; Feng et al., 2018).

Welcome or not, change is coming to rural America. Picturesque red barns are giving way to metal free-stall barns, farms are growing, toiling hands are being replaced by tireless machines. Rural towns are facing a steady decline in population accentuated by shocks like the COVID-19 pandemic.

Our research offers a mixed bag for rural communities. On the one hand, rural counties with labor-intensive agricultural sectors will suffer when the labor market experiences negative shocks. These communities may need more robust social safety nets to deal with these shocks when they come. On the other hand, rural counties with less labor-intensive agricultural sectors seem more insulated from labor market shocks. If there is a silver lining, it may be that as a county's population dwindles, it may counterintuitively signal greater resilience to the ups and downs of the labor market.

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Exploring the Implications of Increased Rural Trail Use During the COVID-19 Pandemic on Health, Planning, Equity, and Inclusivity

Lauren E. Brown, Molly Basak-Smith, Kimberly Bradley, Stacey F. Stearns, Anita T. Morzillo, and Sohyun Park

JEL Classifications: I1, I3, Q5, R1, Z3
Keywords: National Resources, Outdoor Recreation, Public Health, Rural Development, Well-being

This article is based on collaborations developed through the Northeast Center for Rural Development small grant *Best Practices in Bike/Pedestrian Trail Data and Monitoring*.

Social distancing measures are changing how we think about and use outdoor spaces. Since the start of the COVID-19 pandemic and associated restrictions on many events and activities, use of trails in communities across the United States has surged, in some areas up to 200%. As the pandemic continues, park managers remain focused on urgent public health and safety concerns. However, immediate and longer term increased outdoor space use poses both challenges and opportunities for trail and environmental management, public health, economic asset development, equity and access. It is yet to be seen if these short-term reactive trends will lead to long-term changes either in recreational behavior or community recreation policy. Meanwhile, exploring ongoing impacts may help communities identify potentially beneficial strategies, policies, and programs. As of this writing, policies continue to shift to address the changing nature of the pandemic from region to region, and from local to national levels. Our objective is to explore these potential implications from the perspective of two stakeholder groups associated with recreation use of outdoor space: trail managers and trail users.

A growing number of studies and reports document a surge in trail use during the COVID-19 pandemic, primarily provided by data collected through monitoring programs, trail manager, and user surveys (Bradley et al., 2020; Derks et al., 2020; Oftedal, 2020; Pennsylvania Environmental Council, 2020; Kapp and Oberg, 2020). Typically, these data are collected through existing installed data counters, TrafX or Eco-counters, from which data from previous years provide an annual baseline for comparison. For example, a study of ten Minnesota trails found that nine of the ten monitored locations set daily traffic records in the year 2020 for March and April trail use, and that trail use increased further with every successively introduced pandemic-related restrictive measure (Oftedal, 2020). In the northeast, the Pennsylvania Environmental Council reported individual trail increases of 100-200% for some trails, and an overall increase in use of 52% in March across all trails compared to 2019, effectively kicking off the use season a month early (Pennsylvania Environmental Council, 2020).

Similarly, the Connecticut Trail Census, when compared to 2019 data, documented monthly use increases through July 2020; the greatest change occurring in the month of March (82%). However, further analysis comparing 2019 and 2020 data from the Connecticut Trails Census revealed that these patterns were not consistent across all types of trails. For example, analysis of subset of sixteen trails including three in rural areas[1] found that rural trails experienced an increase in use in 2020 over 2019 during every month of the year, peaking at a 162% increase in March 2020. In contrast, trail use on semi-rural, suburban, and urban trails in August 2020 dropped from 2019 numbers. Yet, rural trail use in 2020 was still greater than 2019 by more than 11% (Bradley et al., 2020).

Why is trail use increasing? This surge may be the result of both displacement from other routine activities, displaced use from areas like parks that may have closed, and increased interest among new users. Since the start of the pandemic, the National Parks and Recreation Association has conducted bi-weekly "snapshot" surveys of amenity managers regarding recreational amenities that were open, partly open, or closed due to social distancing measures. During peak closures in spring 2020 when more than 50% of sports facilities and playgrounds were closed, over 90% of trails were either open or partly open -- although percentages varied from region to region nationally. As a whole, trails

Figure 1. Pandemic Impacts on Rural Trail Use

and local or neighborhood parks have been the most universally open outdoor recreational resources throughout the course of the pandemic (National Recreation and Park Association, 2020).

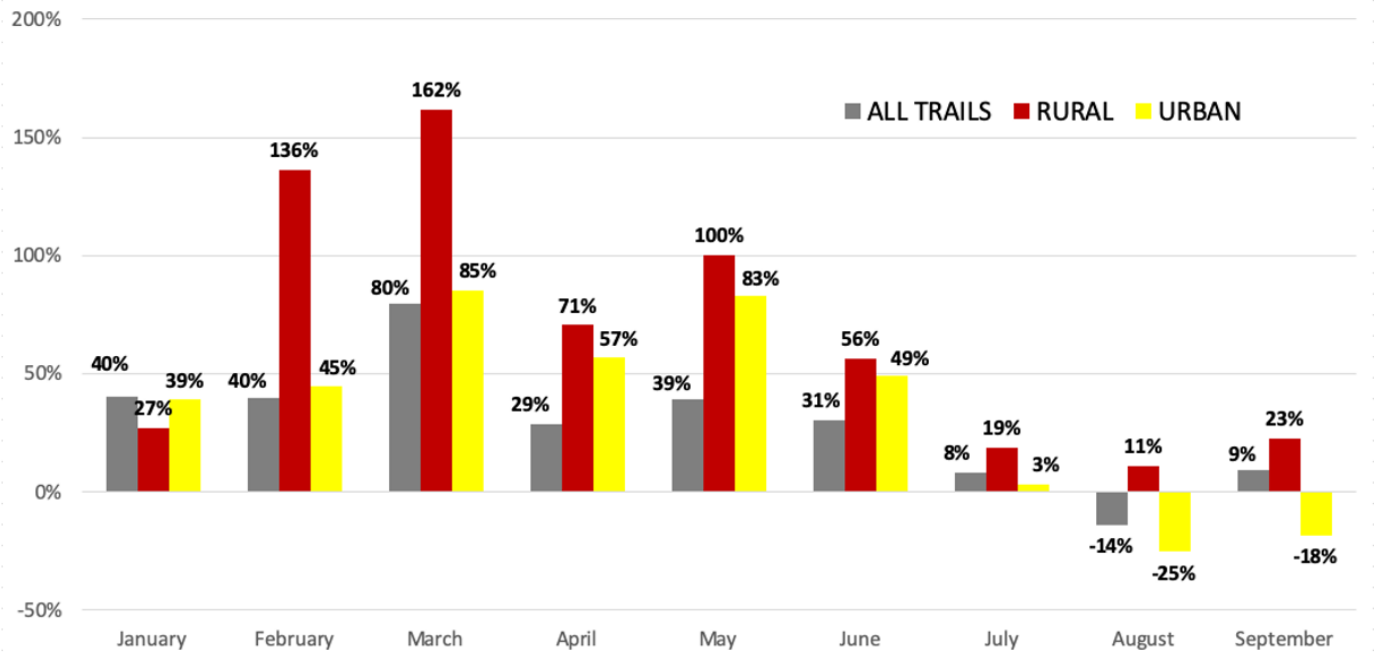
But this does not tell the whole story. Recent data from a survey of the Leave No Trace network suggests changes in outdoor recreation use among enthusiasts, defined as those who are highly reliant on outdoor recreation as a means of leisure (Rice et al., 2020). Given stay at home orders, frequency of outdoor recreation among enthusiasts decreased from 5.07 days per week to 4.76 days per week (by 0.03 days for rural residents, 0.37 days for urban cluster[i] residents and 0.52 days for urban residents), average distance traveled decreased from 3.5 miles to 1.94 miles, average group size decreased from 5.61 to 1.85 persons (Rice et al., 2020). While these data are important for understanding the immediate impacts of closures on enthusiast users, it is important to note that data were collected early in the pandemic (April 2020) when many areas we discouraging any trips outside the home and so may not reflect long term trends. We suspect, however, that "new" users are comprising a larger proportion of all trail users during the pandemic, and existing users are participating in trail use more frequently overall. Both posits are anecdotally supported by preliminary Connecticut Trails Census data (n = 993), which suggest that about 16% of respondents did not use the trails prior to the COVID-19 pandemic, whereas 22% of existing users use trails more frequently (Brown and Bradley, 2020).

Implications for Public Health

The possibility that more rural people are engaging in physical activity on trails may be a positive sign for public health in rural communities affected by COVID-19. Several studies have found positive relationships between presence of trails and physical activity as well as trail use and physical activity (Frost et al., 2010; Brownson et al., 2004). Additionally, throughout the COVID-19 pandemic, public health experts have advocated for increased accessibility and availability of greenspaces to promote socially distant physical activity (Slater et al., 2020). The physical and mental health benefits of activity in greenspaces is well documented, and suggests that even a limited time engagement in exercise in greenspaces may be associated with lower rates of heart disease, depression, and stroke; lower blood pressure, enhanced immune system function, and greater self-esteem and mood than in individuals who do not pursue such activity (Barton and Pretty, 2010; Coon et al., 2011; Gladwell et al., 2013; Harvard Medical School, 2009; Kuo, 2011; Li et al., 2011; Li et al., 2008; Park et al., 2007; Wood et al., 2016).

However, the potential for rural communities and vulnerable populations to achieve gains in health outcomes through use of trails and greenspaces depends in part on their ability to overcome barriers to physical activity. These barriers may include factors related to access, socioeconomics, available time for recreation, and individual motivation (Gavarkovs et al., 2017; Kurti et al., 2015), all factors that may also be

Figure 2. Percent Change in Monthly Trail Use by Trail Type: 2019 – 2020 Connecticut Trail Census*



** Bradley, K, Budris, A, Wilson, E. Brown, L. Connecticut Trail Census (CTTC). (2020) Connecticut Trail Census Aggregated Count Data . https://cttrailcensus.uconn.edu/understanding-the-data/countdata/ Trail uses are based on hourly trail data collected from 16 automated TrafX counters on trail sites for which complete data was available located in East Hampton, New Britain, Cheshire, Hamden, New Haven, Bolton, Vernon, Oxford, Middlebury, Derby, Wilton, Hartford, Madison, Brookfield, and Torrington. Total (n=16), Rural (n=3), Urban (n=4). Rural trails were defined as trails located in communities with an estimated 2020 population of <10,000 and a population density of <500 people per sq/mile. Semi-rural trails met the population density criteria but populations of larger than 10,000. Suburban trails did not meet either criteria but had populations of less than 50,000 and Urban trails had populations of 50,000 or greater.*

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affected by job losses, school closures, and other stressors related to the pandemic.

Many rural areas face additional vulnerabilities that place populations at greater risk for COVID-19 including a greater proportion of the population comprised of relatively older, uninsured, and people with existing health conditions; fewer physicians, unavailability of mental health services, and greater proportion of the population with a disability (Peters, 2020). Eighty percent (80%) of deaths attributed to COVID-19 have been among adults aged 60 years or older (Centers for Disease Control Morbidity and Mortality Weekly Report, 2020). These observations raise serious public health concerns, considering that 19.3% of the U.S. population resides in rural areas, and the average age of rural Americans being 73.3 years old (Wong et. al., 2019). Risk for obesity is also greater among rural populations, such that the odds of being obese among rural adults is 1.19 times greater than that among urban adults (Trivedi et al., 2015). Chronic comorbidities, including obesity, hypertension, diabetes, cardiovascular disease, cerebrovascular disease, respiratory disease, kidney disease, and malignancy are clinical risk factors for a severe or fatal outcome associated with COVID-19, with obesity being the most prevalent and respiratory disease being the most strongly predictive (Zhou et al., 2020).

People living alone have also faced particular risks of isolation and loneliness during the pandemic; related to this, older adults in rural areas are among the most likely to be isolated from creative, technologically-based adaptations to social activities (Henning-Smith, 2020).

Therefore, characteristics of individuals most at risk of developing severe cases of COVID-19 are similar to those who have reported greater frequency of social isolation - older adults and people with underlying medical conditions (Lewis et al., 2020).

Even for those who have not experienced the COVID-19 illness, public health effects of the pandemic and associated impacts of social distancing guidelines will likely be observed in communities for many years to come. Long-term isolation could expedite cases of post-traumatic stress (Brooks et al., 2020) and exacerbate existing unfavorable health conditions (Ortiz-Ospina, 2019 as cited in Samuelsson et al., 2020).

Implications for Trail Management and Planning

The introduction of significant numbers of new users on rural trails presents opportunities and challenges for management. Even with decreased staffing and volunteers, rural trail managers have been forced to adapt quickly with public health signage and guidelines

and changing maintenance schedules or facility structures to address littering, crowding, and overuse (Kapp and Oberg, 2020; Pennsylvania Environmental Council, 2020). When asked to identify positive and negative impacts of the COVID-19 pandemic on trails, 97 trail managers in Connecticut identified parking lot capacity limitations and crowding, littering, increased number of users, changes in standard maintenance (bathrooms, trash collection, mowing, etc.), conflict among trail users, change in use patterns, and change in user demographics among the top negative impacts (Brown and Bradley, 2020).

Response by recreation managers to these factors has included in some cases, trail and area closures, but more often the increased promotion of lesser used trails, improved signage, and facility changes such as making overflow parking available.

If trail use continues to remain greater than pre-pandemic levels, land use managers may consider adding trails to existing networks or increasing the quantity of accessible greenspaces to reduce user density. From a policy perspective, this may have implications for funding and resource needs to support increased use and mitigate impacts of overuse. Other changes to trails or green spaces may include improved or increased outdoor programming, spatial design that supports social distancing, or overall improvements in greenspace infrastructure. The COVID-19 crisis also presents the potential for better integration of health into greenspace planning and design.

Implications for Equity and Access

While current discussions are largely around disease control (Honey-Roses et al., 2020), the pandemic offers a new lens for understanding who has access to safe outdoor spaces like trails and parks, and in particular, how systemic inequalities affect the accessibility of greenspace amenities to Black, Indigenous, people of color, and low-income communities.

This is particularly relevant if a significant number of new users are from urban areas that otherwise lack greenspace access, only have proximate access to greenspaces that may be closed during the pandemic, or perceive heavily used urban greenspaces to be unsafe during the pandemic. While the short term data of trail enthusiasts cited earlier found distance traveled to have decreased during the lockdown period of the pandemic, anecdotal analysis of data collected by the Connecticut Trail Census in 2020 suggests that new users during the pandemic may be traveling further from home to use greenspaces that users in previous years; (87%) of new trail users reported living outside the zip code where the trail was located while 69% of trail users overall reported as using trails outside their home zip code.

In some urban areas, many parks and greenspaces with playgrounds, play structures or other features that posed transmission and safety hazards were restricted or closed during the pandemic, raising the possibility that urban residents might have had less access to these spaces. Disparity in access to greenspaces between urban and rural populations is well documented, and in some cases may be traced to discriminatory policy measures such as exclusionary zoning and disparities in funding that disadvantaged people of color. As an example, a review of these disparities in Denver found the geographic location of greenspace amenities largely followed the historic delineations of discriminatory red-lining whereby residents of some neighborhoods were systematically denied access to financial resources (Forrest, 2018; Campbell, 2019; Moore, 2019; Rigolon and Németh, 2018). More resources on equity and access in greenspaces may be found in the Guide to Anti-Racism in the Outdoors (Brown & Rakow, 2020).

Conclusions

COVID-19 presented many social challenges, but the pandemic also offers opportunities for rural land use managers and planners to improve access to trails and greenspaces while maintaining environmental standards, and thereby improve the health of rural populations. The increased interest and awareness serves as a call to better understand needs for expanding existing trail systems, as well as the need for connectedness of trails to existing and potential users. This will involve thoughtful, regional efforts to address land use involving a wide variety of partners. There is opportunity for trail managers and planners to continue current trends through collaborations with public health officials to support and expand outdoor recreational amenities that are safe, accessible, and address current inequities that inhibit use by Black, Indigenous, or people of color.

We believe land use and trail managers must actively address environmental justice issues to address inequitable access and create safe recreational environments for all users and that these efforts must be bolstered with resources and funding. Ensuring that trail and greenspace facilities remain accessible is essential. When access to natural environments such as trails and parks is limited, individuals are less likely to reap the physical and mental health benefits (Rung et al., 2011; Samuelsson et al., 2020; Rice et al., 2020). Land use and greenspace managers, trail advocates, and resource providers should take a leadership role in understanding and providing education about systemic environmental injustices, amplifying voices of Black, Indigenous, and people of color; and ensuring diverse representation on boards and land use decision making committees (Discher, 2020). We hope this work will spur investment in greenspace resources to support increased use as well as the development of more applied and interdisciplinary research to inform better regional land use planning and community development.

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[i] In this study reported type of community of residence was adapted from the U.S. Census Bureau (2010): under 5,000, between 5,000 and 50,000, and over 50,000 residents

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After COVID-19, Will Child Care Survive in Rural Areas?

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In April 2020, a news headline screamed "COVID-19 could wipe out the child care industry in Minnesota" (Orenstein and Schneider, 2020). In September, an article in *Time* magazine claimed "COVID-19 has nearly destroyed the childcare industry" (Vesoulis, 2021). Like many small businesses across the country, child care providers have faced enormous challenges during the COVID-19 pandemic. The pandemic has also raised awareness of the role of child care as critical infrastructure for the economy. Many child care centers and home-based family child care providers closed or reduced enrollment to meet state or local government guidance for safe-distancing and staying at home,[1] especially in the first months of the pandemic. Child care providers who continue to operate face financial challenges due to increased costs and lower revenues. As the country looks forward to recovering from the pandemic, the availability and affordability of child care will play an important role in supporting increased economic activity. Without safe places and nurturing caregivers for young children, employers may be unable to find the workers they need as the economy rebounds. Rural employers struggled with labor shortages prior to the pandemic, and lack of child care was identified as a major rural economic development issue in 2019 (Committee for Economic Development, 2019).

Most parents of young children are in the labor force, and they typically need someone to care for their children while they work. Over two-thirds of children under age six in the United States had all parents in the labor force prior to the pandemic; in Minnesota, the share was 76%.[2] The percentage of children with working parents tends to be higher in rural than in urban areas (Swenson, 2008). Many rural families need care for children during evening or weekend hours to accommodate retail and service-sector jobs or shift work. In rural areas, more of the care is provided by home-based providers than child care centers, which may reflect both the needs of rural working parents and lack of economies of scale for centers in places that are not densely populated (Smith, Morris, and Suenaga, 2020). Family child care providers are more likely to provide evening or weekend care, accommodate flexible work schedules, and on average cost less than center-based child care (Bureau of Labor Statistics, 2021).

Adequate and affordable child care is important for employers as well as families. The U.S. Chamber of Commerce Foundation estimated costs to employers ranging from $400 million to $2.88 billion per state due to child care-related absences and employee turnover (U.S. Chamber of Commerce Foundation, 2019). With child care and school closures during the pandemic, labor force participation among mothers with young children dropped nearly 4 percentage points between November 2019 and November 2020 (Boesch, et al. 2021). Lost productivity, higher costs, and lower labor-force participation due to lack of affordable and accessible child care options could impede the economy's recovery from the pandemic.

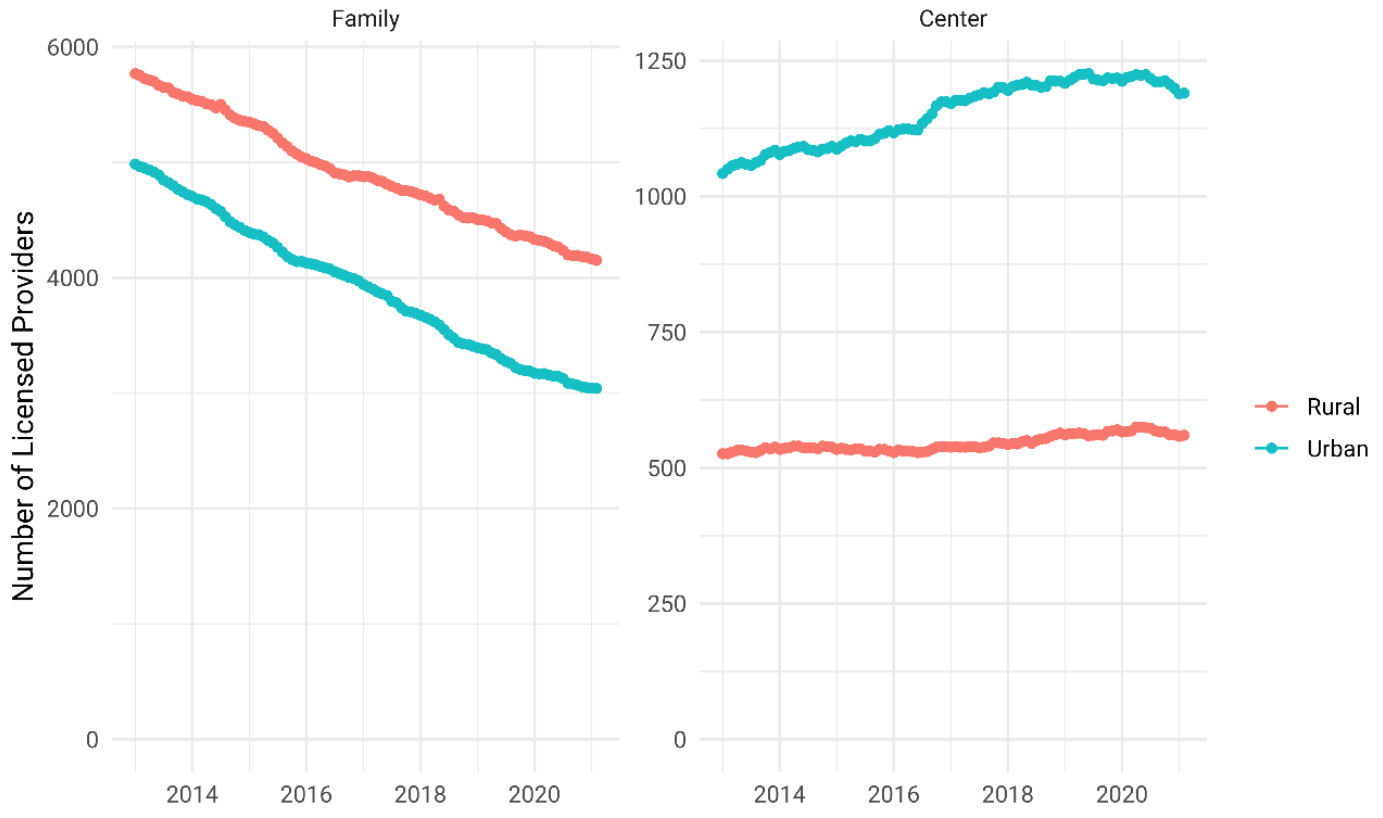
Child Care Shortages in Rural Areas prior to the Pandemic

Child care availability and affordability were known to be critical economic development issues in rural areas prior to the pandemic (Center for Rural Development and Policy, 2017). In 2018, nearly 60% of rural census tracts were defined as "child care deserts" (Malik, et al., 2018), meaning there were more than three children for each space in a licensed child care setting. The shortage of child care in rural areas is related to the decline in licensed family or home-based providers, which fell

[1] Family child care providers, also known as home-based providers, provide child care services in their residences to children who are not related to them. Regulations and licensing requirements for family child care providers differ across states. Here we use the term "child care providers" to include both family child care providers and child care (daycare) centers.

[2] Source: Kids Count data retrieved from https://datacenter.kidscount.org/data/tables/5057-children-under-age-6-with-all-available-parents-in-the-labor-force. The definition of all available parents in the labor force: For children living with single parents, that parent is in the labor force. For children living with two parents, both are in the labor force.

Figure 1. The Number of Family Child Care Providers in Minnesota Has Fallen Steadily since 2013, While the Number of Child Care Centers Has Increased



Source: Authors' calculations based on licensing data.

nationally by 25% between 2011 and 2017 (National Center on Early Childhood Quality Assurance, 2019). The overall capacity of the child care sector (the number of children who can be served) did not decrease, however, as more and larger child care centers have opened. The shift to more center-based care obscures the challenges that many parents, especially those in rural areas, face in finding care (Center for Rural Development and Policy, 2017). Child care accessibility varies spatially within counties and communities (Davis, Lee, and Sojourner, 2019) and some observers consider the lack of child care options in rural areas to have reached crisis levels (Center for Rural Development and Policy, 2017).

In Minnesota, the number of family child care providers statewide peaked above 14,000 in 2002 and has declined steadily since then, falling below 8,000 by 2019 (Minnesota Department of Human Services 2020a). As shown in Figure 1, the numbers of family child care providers have declined in both rural and urban locations in Minnesota while the number of centers has increased, particularly in urban areas.[3] Factors contributing to the decline include the retirement of Baby Boomer–age providers, low pay and benefits, and the challenging nature of the work, including limited interactions with other adults and physical demands (Minnesota Department of Human Services, 2020b). The rate of new child care businesses opening has fallen as other careers in the strong prepandemic economy paid better, offered benefits, and presented more advancement opportunities (Minnesota Department of Human Services, 2020a).

Child Care Shortages in Rural Areas Worsened during the Pandemic

In contrast to K–12 school districts, which largely closed school buildings and switched to remote learning, child care facilities were allowed to remain open in nearly all states (although in 17 states they were allowed to care only for children of essential workers) (U.S. Department of Health and Human Services, 2020). Despite being allowed to stay open, state agencies reported that nearly two-thirds of child care centers and one-quarter of family child care providers were closed as of April 30, 2020,

[3] Using the geocoded location of each child care provider and Census definitions, for this report "urban" includes providers located in urbanized areas (population of at least 50,000) and rural includes those located in urban clusters (population 2,500–50,000) and rural areas. The latter two categories were combined into a rural group.

(U.S. Department of Health and Human Services, 2020). Providers who were open faced higher costs due to the increased need for cleaning and sanitizing supplies and personal protection equipment (PPE). One study estimates these factors have raised the cost of providing care by nearly 50% (Workman and Jessen-Howard, 2020). Providers also experienced lower enrollment and changes in group size regulations that limited their revenues and added to their costs (Grunewald, 2020a).

To remain financially viable, the child care business model relies on (nearly) full enrollment. One of the biggest uncertainties currently facing child care providers is when (and whether) their enrollment levels will rebound to prepandemic levels. As of November 2020, a national survey of open providers found that attendance is down by two-thirds, and many child care providers have taken on personal debt or dipped into savings to cover revenue shortfalls (NAEYC, 2020). Under current conditions and without additional funding, one-quarter of centers and one-third of family child care providers predicted they would close in the next few months (NAEYC, 2020). Such closures are likely to exacerbate the child care shortages that existed prior to the pandemic.

The Minnesota Response

From the start of the pandemic, Minnesota has undertaken actions intended to ensure that sufficient child care is available to support the current needs of essential workers and to stabilize the industry for future workforce needs. Minnesota declared child care to be essential and child care businesses were encouraged to stay open. PPE and cleaning supplies were provided. The state quickly granted approximately $41 million to child care providers throughout the state through a competitive grant process (the Peacetime Emergency Child Care Grants).[4] The grants were intended to ensure that child care providers could stay in business to support essential workers despite increased operating costs associated with the pandemic (e.g., cleaning supplies and personal protective equipment or PPE). Centers and family child care providers could apply for the grant each month for three months from April through June 2020. About 51% of providers who applied received at least one grant, with the average grant award (summed over the three months) of $8,900 for family child care providers and $29,000 for centers. Beginning in July 2020, the state switched to smaller, noncompetitive grant payments to child care providers; these monthly grants continued through December 2020.[5] Overall, the state distributed over $150 million in funding to child care providers in Minnesota between April and December 2020.

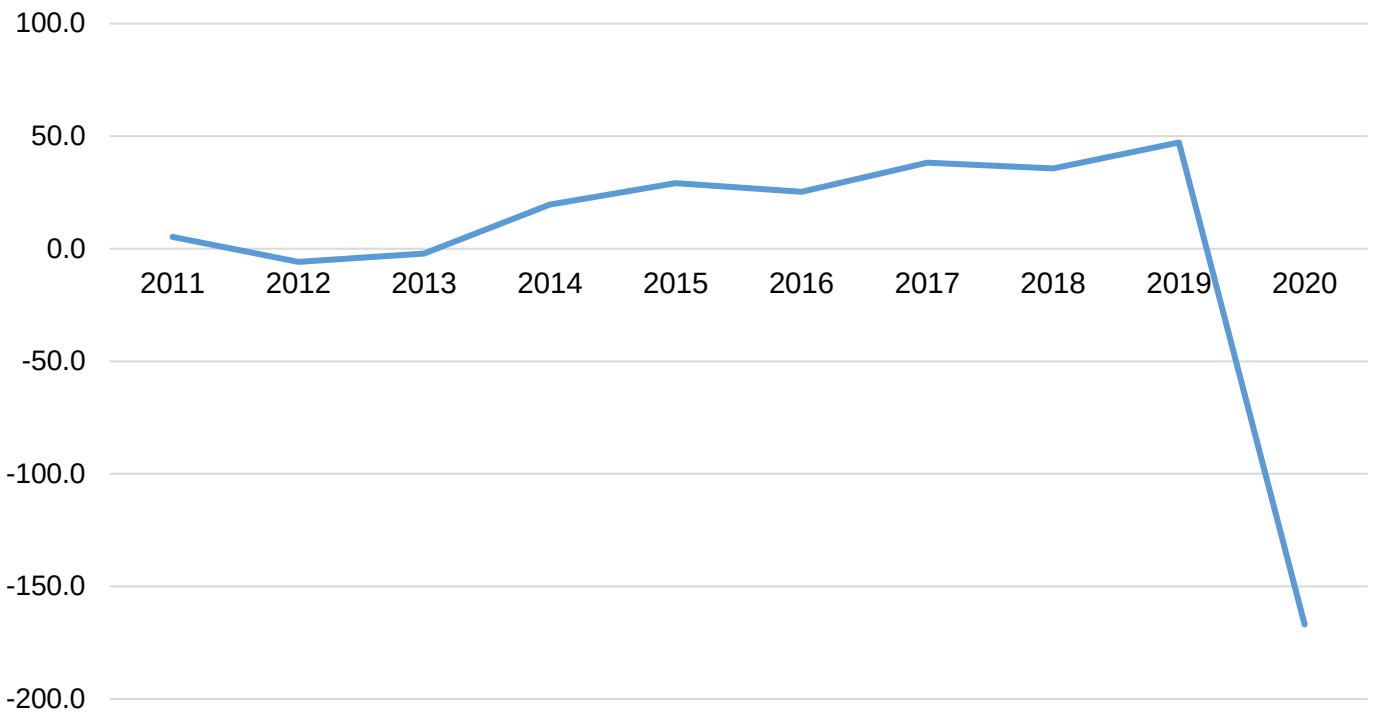
To better understand the effects of the pandemic and the grants on child care in Minnesota, we conducted a survey of providers and analyzed data on the number of licensed providers who closed between March 2020 and December 2020. A survey was sent in August 2020 to child care providers who applied for the Peacetime Emergency Child Care Grant program to learn more about how providers used the grant funds and to understand their experiences during the early months of the pandemic.[6] Of the 5,297 providers who applied for these grants, 1,898 (36%) responded to the online survey.[7]

The results of the survey highlight the challenges faced by rural child care providers in Minnesota. Nearly two-thirds of rural family providers and half of centers in rural areas applied for the grants between April and June.[8] Most providers reported using grant funds to help pay for cleaning and sanitizing supplies or other health and safety materials. Other expenses paid with the grants included food, utilities, and rent or mortgage. Family child care providers on average reported financial losses of about $4,000 since the start of the pandemic (as of August). Losses were higher for child care centers than for family providers, and larger centers experienced higher losses due to greater losses in revenue. On a dollars per licensed capacity basis, centers in urban areas reported losses of nearly $900 per seat compared to just over $300 per seat in rural areas. About one of every seven child care providers thought it likely they would close in the next six months in both rural and urban areas.

Despite the pandemic, on February 1, 2021, the total number of licensed child care providers in Minnesota was nearly the same as the number in March 2020, prior to the first stay-at-home order issued by the governor. Undoubtedly, the funding from the state helped to sustain the industry, yet the total numbers open do not capture all of the turmoil and financial struggles experienced by the sector or the challenges that lie ahead, particularly in rural areas. Between March 2020 and February 2021, 404 (9%) of rural family child care providers left the business, and 36 (6%) of rural centers closed their doors. On a more positive note, during the same period, 238 new family child care providers and 28 centers opened in rural Minnesota. While the rate of

[4] For more information about the grants, visit https://www.childcareawaremn.org/providers/emergency-child-care-grants/. Funding was provided through the CARES Act.
[5] In January 2021, the state had announced plans to continue funding grants to child care providers through May 2021.
[6] The survey was conducted by Child Trends and the Minnesota Child Care Policy Research Partnership. Of the 5,297 providers who applied for these grants, 1,898 (36%) responded to the online survey. For more information, visit https://www.childtrends.org/project/minnesota-child-care-policy-research-partnership.
[7] The margin of error for the survey is 2%. We compared the characteristics of respondents and nonrespondents and found some differences. Grant recipients were slightly more likely to respond than those who did not receive a grant.
[8] Centers funded by the Head Start program or by local school districts were not eligible for the grants.

Figure 2. Net Change in U.S. Employment in Child Day Care Services Industry Shows Large Drop from December 2019 to December 2020



Source: https://data.bls.gov/timeseries/CES6562440001&output_view=net_12mths.

entry was slower in 2020 than previous years, the ability of new providers to open during the pandemic suggests that the sector has some ability to expand as the economy recovers.

While Minnesota was successful in keeping most licensed child care providers open, many are operating at less than full enrollment and incurring financial losses (Bailey, 2021). As a result, their long-term sustainability is in doubt. As of early February 2021, 60% in Minnesota reported normal attendance levels compared to about half of child care centers nationally (Procare Solutions, 2021). While exact numbers on child care closures are difficult to obtain nationally, the industry as a whole lost 166,800 jobs between December 2019 and December 2020 (see Figure 2). It will be important for states and communities to track changes in the supply of care in rural areas to monitor whether rural supply shortages have worsened.

Public Support Needed for Child Care Businesses

Supporting the child care sector in dealing with the challenges of the pandemic is likely to have societal benefits greater than for other sectors of the economy. Closure of a child care business, whether home- or center-based, has repercussions for families, employers, and the sector as a whole. Most licensed child care providers receive specialized training and professional development whose costs are partially subsidized with public funding, and closure may mean the loss of this specialized knowledge and experience (the “human capital” of the sector). Families may find it more difficult to find care for their children and may rely on unlicensed care which may not meet basic health and safety standards. Parents, especially mothers, may opt out of the labor force and employers may not be able to find all the workers they need as the economy rebounds. Providing relief funds to child care providers during this period of lower enrollment and higher costs is necessary to avoid worsening child care shortages in rural areas.

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USDA's Community Facilities Program May Help Rural America Cope with COVID-19

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Introduction

Since the first cases of COVID-19 appeared in January 2020 in the United States, the pandemic's death toll has risen sharply in the country, surpassing 540,000 deaths as of March 19, 2021, which is more than the number of Americans who died in World War II (Sergent and Padilla, 2021). Initially, the incidence of COVID-19 (cases per 100,000 people) was greater in metro areas than in nonmetro areas of the country,[1] but this trend started to change after October 2020, when the cumulative cases per 100,000 in nonmetro areas started to surpass the cases in metro areas. By December 2020, nonmetro areas recorded 4,500 cumulative cases per 100,000 while metro areas recorded 4,000 cases per 100,000 (ERS "COVID-19 Pandemic", 2020). Starting August 2020, COVID-19-related deaths (per 100,000) in nonmetro areas also started to surpass that of metro areas and so did the weekly rate of new infections (Murphy and Marema, 2021; Marema, 2021).

For several reasons, rural communities may be particularly vulnerable to the COVID-19 pandemic: aging population, greater share of the population with underlying medical conditions, less access to health care services, higher unemployment rates, labor-intensive workforce that requires physical presence at work, longer commutes to work, and distance to medical services and facilities (Ajilore and Willingham, 2020; Dobis and McGranahan, 2021; Marema, 2021; ERS "Rural America", 2020; Vestal, 2020; Zaller, 2020). For example, 17% of the nonmetro population was at least 65 years old in 2012–2016, compared to only 13.8% in metro areas (ERS "Rural America at a Glance", 2020; Smith and Trevelyan, 2019). Probably the biggest challenge is the lack of access to hospitals and health facilities, let alone intensive care units that can treat acute COVID-19 cases (Ajilore, 2020; Dobis and McGranahan, 2021). According to the USDA Economic Research Service (ERS "Rural America at a Glance", 2020), in 2016–2017, the United States had 116 counties without a medical clinic or hospital, 97 (83%) of which were nonmetro counties. Additionally, 77% of counties without an intensive care unit were also in nonmetro counties. These long-running health and economic inequities in rural areas remain a key focus of federal rural policy.

The main goal of the USDA's Rural Development (RD) mission area is to advance rural prosperity and improve quality of life in rural America. The RD offers loans, loan guarantees, grants, and technical assistance programs to accomplish this goal, and there are several programs targeted toward improving rural health. The Community Facilities (CF) Program is one of the major RD programs, and it finances community facilities and infrastructure development in rural areas including health care systems and related services and amenities. Although the CF Program was instituted in the late 1960s, there have been no published studies on the program. In this short paper, we detail CF investments to health facilities for the period between 2016 and 2020 and associated COVID-19 conditions at the county level. We also investigate whether CF health-funded counties had a lower COVID-19 death rate compared to a similar group of counties that did not receive CF health funds during the same period. Our analysis shows that

[1] USDA Economic Research Service (ERS) rural–urban continuum codes (RUCC) were used to classify counties as metro/urban (codes 1–3) and nonmetro/rural (codes 4–9). These codes include nine categories: large metro areas (counties in metro areas of 1 million or more population, RUCC = 1), medium metro areas (in metro areas of 250,000 to 1 million population, RUCC = 2), small metro areas (in metro areas of 50,000 to 250,000 population, RUCC = 3), nonmetro counties with an urban population of 20,000–49,999 (adjacent or nonadjacent to a metro area, RUCC = 4 or 5), nonmetro counties with an urban population of 2,500–19,999 (adjacent or nonadjacent to a metro area, RUCC = 6 or 7), and nonmetro counties with an urban population of less than 2,500 or completely rural (adjacent or nonadjacent to a metro area, RUCC = 8 or 9). See https://www.ers.usda.gov/data-products/rural-urban-continuum-codes.aspx.

nonmetro counties had higher COVID-19 case and death rates than metro areas, and high-poverty counties had higher COVID-19 case and death rates than low-poverty counties. Regardless of rurality or poverty level, CF health-funded counties had lower COVID-19 case and death rates. Results of the impact analysis show that, on average, CF health-funded counties had 0.22 percentage points lower COVID-19-related deaths (per case) in nonmetro areas compared to a group of similar counties that did not receive health-related CF investments, implying 220 fewer deaths per 100,000 cases in CF health-funded counties. These impacts are even stronger for remote, nonmetro counties that received CF health funds where the COVID-19 deaths per case was 0.55 percentage points lower compared to the nonrecipient group of counties, implying 550 fewer deaths per 100,000 cases in CF health-funded counties.

Community Facilities (CF) Program

The Community Facilities Program offers grants and loans programs for rural America to improve facilities and infrastructure, including hospitals, health care clinics, assisted living facilities, rehabilitation centers, public buildings, schools, community-based facilities, and fire and rescue stations. The program also covers costs for land acquisition, professional fees, purchase of equipment, and technical assistance (USDA RD, 2021). We obtained administrative program data from Rural Housing Services (RHS) of the USDA Rural Development and use project descriptions and North American Industry Classification System (NAICS) codes to select health-related investments. We focus on CF health-related grants and loans obligated for the period between 2016 and 2020. During this period, 508 counties, about 16% of U.S. counties, received $3.6 billion in CF health-related investments (Table 1). Communities—counties, small towns, or villages—with less than 20,000 population are eligible for all CF programs.[2] Priority is also given to low-income communities.[3] Due to this subcounty population eligibility criterion, a small village or a town inside a metro county can also qualify for CF program.

Community Facilities Health Investments and COVID-19

In this section, we briefly investigate the incidence of health-related investments of the CF Program in relation to COVID-19 pandemic, identifying areas and populations benefiting from the programs and comparing those to eligible areas and populations not benefiting from the program. We group the counties into metro and nonmetro areas using the Rural–Urban Continuum Codes (RUCC) for 2013 developed by the USDA Economic Research Service,[4] which classifies counties into three metro categories and six nonmetro categories based on population size and proximity to urban centers. Eligible communities within metro counties (RUCC 1–3) received 24% of CF health-related funding and nonmetro counties (RUCC 4–9) received 76% of such funding between 2016 and 2020. Counties in RUCC 6 and 7 classifications (nonmetro counties with an urban population of 2,500–19,999) are the closest to the maximum size threshold for CF population eligibility, and these counties received a larger portion of the funding, 23% and 31% respectively. Counties in RUCCs 8 and 9 classifications are completely rural, with urban populations of less than 2,500, and they received 2% and 8% of health-related funding, respectively.

Next, we examine the COVID-19-related health outcomes in the counties that received CF health investments using COVID-19 cases and deaths per 100,000 as measures for COVID-19 outcomes and data from *The New York Times* and the COVID-19 tracking project by Chetty et al. (2020).[5] We also use deaths per case as a percentage for comparison purposes. Figure 1 shows COVID-19 cases and deaths comparison between nonrecipient counties and recipient counties of CF health investments, depending on whether they are metro or nonmetro. In general, cases per 100,000, deaths per 100,000, and death rate per case are lower in counties that received CF health investments. CF recipient counties reported 4,623 cases per 100,000, while nonrecipient counties reported 4,645 cases per 100,000 from January to November 2020 (Figure 1A). In metro areas, counties with CF health investments reported 308 fewer cases per 100,000 on average. In nonmetro areas, CF recipient counties recorded 90 fewer cases per 100,000 on average compared to nonrecipient counties for the same period. As for COVID-19-related deaths, CF recipient counties reported 72 deaths per 100,000 people while nonrecipient counties reported 79 deaths per 100,000 population as of November 2020 (Figure 1B). Nonmetro CF recipient counties recorded 10 fewer COVID-19 deaths per 100,000 compared to nonmetro, nonrecipient counties (Figure 1B). In nonmetro CF recipient counties, 1.53% of cases resulted in death; the corresponding number in nonmetro, nonrecipient counties was 1.78% (Figure 1C).

[2] Population eligibility is the same for all except for the Guaranteed Loans program and Technical Assistance Training program, which use population less than 50,000 as the cutoff.
[3] Different programs have different income eligibility requirements. The CF direct loan and grants program, which is the biggest program in terms of investments, has a priority point system based on "population, median household income for small communities with a population of 5,500 or less and low-income communities with a median household income below 80% of the state nonmetropolitan median household income." (U.S. Department of Agriculture, 2021).
[4] RUCC codes 1, 2, and 3 are considered "metro," and RUCC codes 4, 5, 6, 7, 8, and 9 are considered "nonmetro" or rural.
[5] See https://tracktherecovery.org/. Case counts and death counts are cumulative as of November 30, 2020, data accessed on December 12, 2020.

Table 1. Community Facilities Health Investments by Rural-Urban Continuum Code (RUCC)

RUCC 2013	Total No. of Counties	No. of Counties Received CF Health	Percentage of Counties Received CF Health $	Percentage of CF_Health Investments to Each RUCC	CF_Health Investments Total, 2016–2020 ($millions)	Total Population 2015 ACS 5 YR (millions)
1	472	34	7%	6%	$217	176
2	394	50	13%	11%	$390	68
3	369	37	10%	7%	$256	29
4	217	35	16%	7%	$267	14
5	92	18	20%	5%	$168	5
6	597	108	18%	23%	$837	15
7	434	111	26%	31%	$1.12	8
8	220	32	15%	2%	$67	2
9	425	83	20%	8%	$278	3
U.S.	3220	508	16%	100%	$3.60 billion	320

Source: ERS, RUCC 2013 (2013); Census Bureau, 2015 ACS 5 YR Estimates; CF Program data by USDA RD Data Analytics Division (2020). COVID-19 data by *The New York Times* and Chetty et al. (2020) Economic Opportunity Insights Economic Tracker.

CF Health Investments, Poverty and Distressed Community

The Community Facilities Program gives priority to low-income communities, which have been disproportionally affected by the pandemic (CBS News, 2020; UCLA Public Health, 2020). In this section, we group nonmetro counties based on poverty and distress levels using two measures: persistent poverty and Distressed Community Index (Economic Innovation Group, 2020). Persistent poverty counties are defined as those that had 20% or more of the county population living under established poverty-level household incomes in each of the last three decades (based on decennial census). We find that regardless of whether a county received CF health investments, persistently poor counties suffer more from COVID-19 in rural America. On average, nonmetro counties with persistent poverty reported 610 more COVID-19 cases (Figure 2A) and 54 more COVID-19-related deaths per 100,000 (Figure 2B). However, the persistent-poverty counties with CF health investments had overall better COVID-19 outcomes than those without CF investments. In nonmetro areas, 22% of counties with persistent poverty received CF health investments between 2016 and 2020 and 19% of nonpersistent-poverty counties received such investments. The nonmetro persistent-poverty counties that received CF investments reported 180 fewer cases (Figure 2A) and 26 fewer deaths (per 100,000 population) (Figure 2B) compared to the nonmetro persistent-poverty counties that did not receive CF investments. Similarly, persistent poverty counties with CF health investments in nonmetro areas reported 0.51% fewer deaths per case compared to persistent poverty counties without CF investments (Figure 2C).

The Distressed Community Index (DCI) developed by the Economic Innovation Group (2020) encompasses not only a county's poverty level but also other socioeconomic conditions such as education, unemployment, adults not working, housing conditions, income, and changes in employment and number of local businesses. The DCI ranges from 0 to 100 (0 being the most prosperous and 100 the most distressed) and classifies counties into five categories: prosperous (DCI < 20); comfortable (20 < DCI < 40); mid-tier (40 < DCI < 60); at-risk (60 < DCI < 80); and distressed (DCI > 80). The counties classified as mid-tier, at-risk, and distressed together received more than half of the total CF health investments allocated to nonmetro counties between 2016 and 2020 (Figure 3). Figure 3 also shows that distressed counties received the largest proportion (28%) of total CF health investments.

We find that regardless of whether counties received CF health investments, distressed areas experienced more COVID-19 cases and deaths in rural America (Table 2). Distressed counties reported 452 more cases per 100,000 than prosperous counties. Looking at death rates, distressed counties reported 112 deaths per 100,000 and 2.27% deaths per case, while prosperous counties reported 62 deaths per 100,000 and 1.12% deaths per case. Nevertheless, counties that received CF health investments generally fared better in both cases per 100,000 and death rates (per 100,000 and per case) (Table 2). Among distressed counties, CF

Figure 1. Comparison of COVID-19 Health Outcomes between CF Health-Funded versus No CF Health-Funded Counties for Metro and Nonmetro, 2016–2020

Figure 1A. COVID19 Cases per 100,000

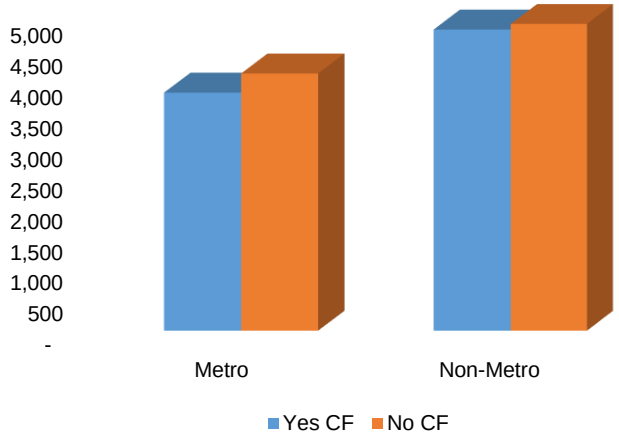


Figure 1B. COVID19 Deaths per 100,000

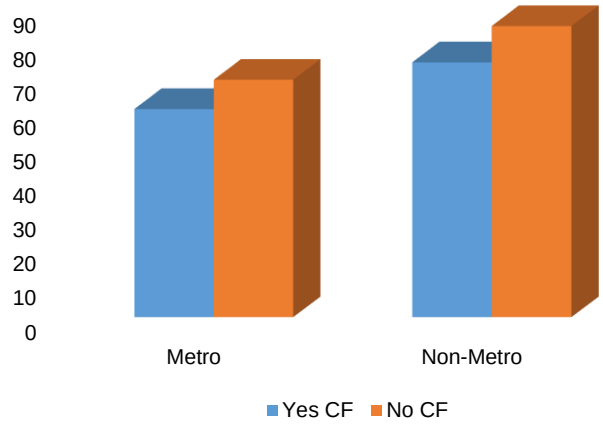
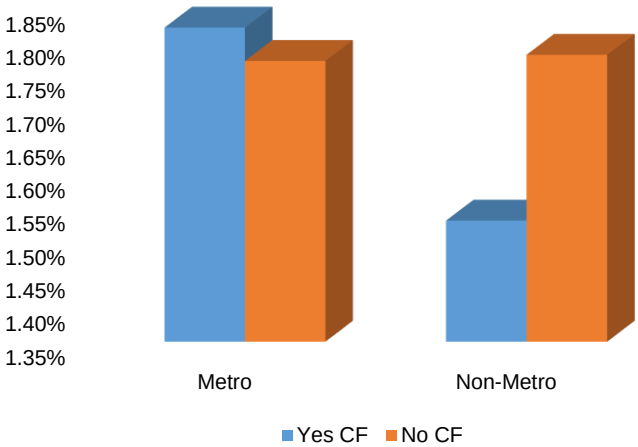


Figure 1C. COVID19 Deaths per Case



Source: Authors' calculations using USDA RD CF Program Data, COVID-19 data by *The New York Times* and Chetty et al. (2020) Economic Opportunity Insights Economic Tracker.

Figure 2. Persistent Poverty: COVID-19 Health Outcomes in Rural America

Figure 2A. COVID19 Cases per 100,000

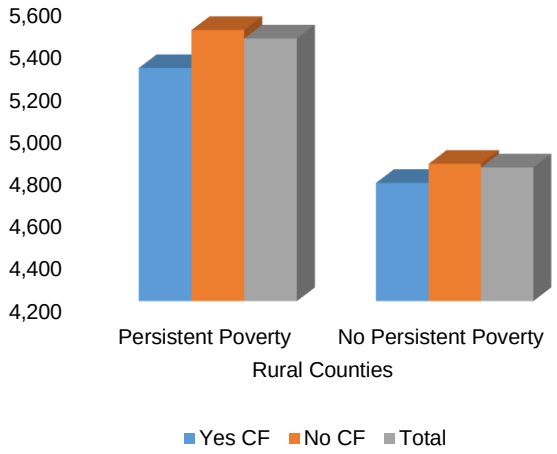


Figure 2B. COVID19 Deaths per 100,000

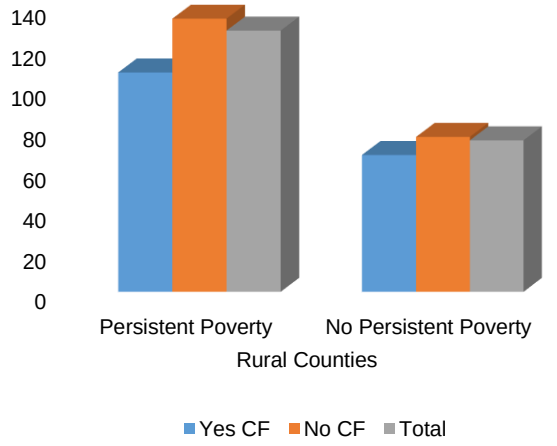
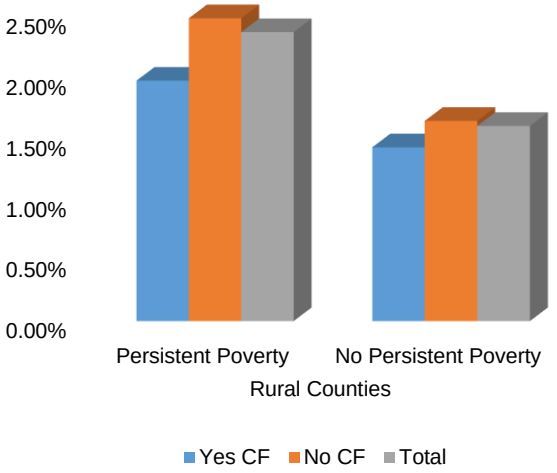
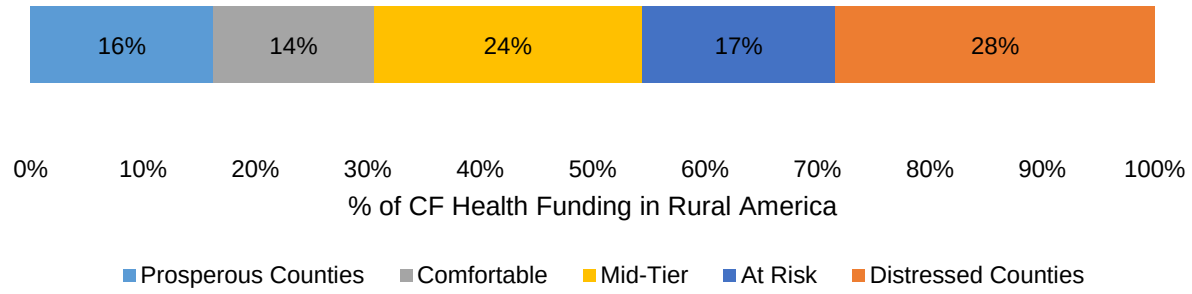


Figure 2C. COVID19 Deaths per Case



Source: ERS, RUCC (2013); Census Bureau, 2015 ACS 5 YR Estimates; CF Program data by USDA RD Data Analytics (2020). COVID-19 data by *The New York Times* and Chetty et al. (2020) Economic Opportunity Insights Economic Tracker.

Figure 3. Distribution of CF Health Investments in Rural America by Distressed Community Index



Source: Economic Innovation Group, Distressed Community Index 2013; ERS, RUCC 2013; Census Bureau, 2015 ACS 5 YR Estimates; CF Program data by USDA RD Data Analytics (2020). COVID-19 data by *The New York Times* and Chetty et al. (2020), Economic Opportunity Insights Economic Tracker.

Table 2. Distressed Community and COVID-19 Death and Case Rates per 100,000 with CF Health-Related Investments, 2016-2020

	Average COVID-19 Cases per 100,000		Average COVID-19 Deaths per 100,000		Average COVID-19 Deaths per Case	
CF Health Investments	Nonmetro Most Distressed	Nonmetro Prosperous Counties	Nonmetro Most Distressed	Nonmetro Prosperous Counties	Nonmetro Most Distressed	Nonmetro Prosperous Counties
Yes	4,691	5,464	98	47	2.02%	0.93%
No	5,045	5,416	115	66	2.33%	1.18%
Total	4,974	5,426	112	62	2.27%	1.12%

Source: Economic Innovation Group, Distressed Community Index 2013 (2020); ERS, RUCC 2013; Census Bureau, 2015 ACS 5 YR Estimates; CF Program data by USDA RD Data Analytics (2020). COVID-19 data by *The New York Times* and Chetty et al. (2020) Economic Opportunity Insights Economic Tracker.

nonrecipients. In terms of death per cases, distressed CF recipient counties reported 2.02% of deaths and distressed nonrecipient counties reported 2.33% of deaths. However, among prosperous counties, CF recipient counties reported 48 more cases per 100,000 than nonrecipients; interestingly, prosperous CF-recipient counties reported 19 fewer deaths per 100,000 than the prosperous nonrecipient counties. In terms of cases resulting in deaths, prosperous CF-recipient counties reported a 0.93% death rate while prosperous nonrecipient counties reported a 1.18% death rate.

In summary, the descriptive analysis above shows the vulnerability of rural America to the pandemic, regardless of a county's level of rurality, poverty, or distress. The analysis also confirms that poorer and more distressed counties are more vulnerable to the pandemic. Overall, nonmetro counties that received CF health investments seemed to perform better on average with respect to COVID-19 outcomes, regardless of the level of poverty, level of distress, or remoteness. However, we cannot infer from this descriptive analysis whether the health investments from the CF actually had any impact on lowering COVID-19-related outcomes such as deaths because CF investments were not randomly distributed among counties. In the rest of the paper, we undertake a brief impact analysis to examine whether the lower COVID-19 death rates in the counties that received CF health investments can be attributed to the CF programs.

Impact of CF Health Investments on COVID-19 Death Rates

In this section, we estimate whether CF health related investments had an impact on COVID-19 death rates in recipient counties. We conjecture that the counties that received CF investments for health care, nursing, and private physicians care facilities, and emergency response equipment were better prepared to meet the

Table 3. Average Treatment Effect of CF Health Investments on Deaths per Case

CF Health Investments Yes (1) or No (0)	Average Treatment Effect Coefficient
All counties (275 matched)	-0.0012 (0.0011)
Metro counties (61 matched)	-0.0001 (0.0022)
Nonmetro counties (214 matched)	-0.0022* (0.0013)
Rural, not adjacent to metro (119 matched)	-0.0055*** (0.0017)
Rural, adjacent to metro (95 matched)	0.0007 (0.0014)
Persistent poverty counties (84 matched)	-0.0048* (0.0029)
No persistent poverty counties (466 matched)	-0.0018+ (0.0013)
Not Excluded Group with CF-Investments, 2010–2015	
All counties (501 matched)	-0.0003 (0.0007)
Metro counties (116 matched)	0.0009 (0.0014)
Nonmetro counties (385 matched)	-0.0014 (0.0009)
Rural, not adjacent to metro (211 matched)	-0.0023* (0.0013)
Rural, adjacent to metro (174 matched)	0.0006 (0.0011)

Note: *** indicates |p|<.01; ** indicates |p|<.05; * indicates |p|<.10; **+** indicates |p|<.20. Statistical significances are based on two-tailed tests.
Source: ERS, RUCC 2013; Census Bureau, 2015 ACS 5 YR Estimates; CF Program data by USDA RD Data Analytics (2020). COVID-19 data by *The New York Times* and Chetty et al. (2020) Economic Opportunity Insights Economic Tracker.

COVID-19 pandemic challenges, which would therefore result in a lower COVID-19 death rate. To study the impact, we compare the COVID-19 death rate of nonrecipient counties to that of funding recipient counties. However, CF recipient counties and nonrecipient counties can differ in many ways, making it difficult to compare the outcomes between the two groups of counties. This situation motivates us to use matching techniques to select a comparison group of counties from non-CF funded counties based on economic, demographic, and housing characteristics.

We use several sociodemographic and economic variables measured before our study period to create a matched comparison group of counties. These variables include CF program eligible population data from USDA-RD data and total population, race, ethnicity, age (people over 65), gender, people without health insurance, and median household income from 2015 American Community Survey (ACS) data. We also

control for county-level overall death rates[6] (excluding accidental deaths) for the five-year period before 2016 to ensure that the matched comparison group has similar death rates to that of funding recipient group before the period considered for impacts. Additionally, we control for the rural–urban hierarchy using the Rural–Urban Continuum Codes (RUCC) and make sure that each recipient county in a particular RUCC code is matched with a nonrecipient county in the same RUCC code. The group of funding recipients consists of 505 counties (out of 3,142) that received CF health investments at least once during the period considered. The impact of CF investments on COVID-19 death rate is estimated by taking the difference in death rate between matched recipient and nonrecipient counties.

The impact results reported in Table 3 from the matching analysis show that nonmetro counties with CF health investments had fewer COVID-19 deaths per case.[7] Results for the all-counties model show that the CF health investments recipient counties had a lower death rate compared to nonrecipient counties. However, the coefficient estimate is imprecise, and we cannot rule out that there is no effect of CF investments on COVID-19 death rates. Results for all nonmetro counties and remote nonmetro (nonmetro, not adjacent to metro) samples suggest that the seemingly lower death rate in investments recipient counties in the all counties model is mainly due to statistically significant lower death rate in recipient counties in these subsamples. For all nonmetro counties, having CF health investments could lower deaths per case by 0.22 percentage points. This could mean an additional two people would have survived from COVID-19 for every 1,000 COVID-19 cases, or additional 220 people would have survived for every 100,000 cases due to CF health investments. For the remote nonmetro (not adjacent to metro) county sample, the estimated impact is 0.55 percentage points fewer deaths per case. This could mean additional 550 people would have survived from COVID-19 for every 100,000 cases due to CF health investments in this group of counties. We also estimate the impact by classifying counties based on persistent poverty status. For counties experiencing persistent poverty, the estimated impact is statistically significant and shows a decrease of deaths per case by 0.48 percentage points in a county that received CF health investments. For counties without persistent poverty, CF health-funded counties experienced a 0.18-percentage-point decrease in deaths per case, but this effect is only marginally statistically significant.

Conclusion

We analyze the USDA Community Facilities Program's assistance to health-care related services and facilities for the period between 2016 and 2020 and examine whether the counties that received investments had fewer case counts/rates and death counts/rates compared to the counties that did not have CF health investments. Regardless of the level of rurality, poverty, or distress, rural America is more vulnerable to the COVID-19 pandemic. The analysis also confirms that poorer and more distressed counties are more vulnerable to the pandemic. However, nonmetro counties that received CF health investments seemed to perform better on average with respect to COVID-19 outcomes, regardless of the level of poverty, level of distress, or remoteness. After a descriptive analysis of the program, we present an impact analysis of CF health investments on COVID-19-related deaths, measured in deaths per case. We find that counties that received CF health investments between 2016 and 2020 had fewer deaths per case than counties that did not receive CF health investments in general. We find this effect to be statistically significant among all CF funded nonmetro counties, and even more so in nonmetro remote counties.

However, findings presented in this paper should be viewed with caution. The descriptive analysis presented in the first part of the paper shows some relationships with COVID-19-related outcomes and CF health investments, but this part of the analysis is not meant to draw any inference that CF investments had any impact on COVID-19-related outcomes. Findings presented in the second part of the paper are meant to draw causal inferences, but they should be subject to several caveats. First, this analysis was conducted at the county level even though the CF investments is targeted toward health-related facilities in counties. A more thorough analysis would have been conducted at the facility level, but we do not have access to COVID-19-related outcomes and other facility level covariates that would be required for such an analysis. Second, even though we ensured that our matched control group was similar to the treated group of counties in terms of observed covariates, there could be other, unobserved factors that could affect a county's treatment status. The existence

[6] We use data from the Centers for Disease Control and Prevention and age-adjusted death rate of age 15 years or older for underlying cause of deaths except accidental causes. Centers for Disease Control and Prevention, National Center for Health Statistics. *Underlying Cause of Death 1999-2019 on CDC WONDER Online Database*, released in 2020. Data are from the Multiple Cause of Death Files, 1999–2019, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Co-Operative Program. Accessed at http://wonder.cdc.gov/ucd-icd10.html on January 24, 2021.

[7] We remove counties that received CF health investments between 2010 and 2016 from the control group of counties prior to matching to reduce potential bias. We test the robustness of this exclusion in another set of matching by including them in the control group and calculating the impact. This set of results show that they approximate to those with exclusion but less robust statistically due to the potential inclusion of treated counties in the control group and creating a bias.

of these unobserved factors could lead to bias in findings. Third, it is possible that the health facilities that received CF investments were able to obtain additional investments for the same reasons they were able to secure investments from the CF program and therefore any positive effect of the program on recipient counties could be obscured by other investment programs in these counties.

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COVID-19, the Accelerated Adoption of Digital Technologies, and the Changing Landscape of Branch Banking

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JEL Classifications: D22, G21, R51
Keywords: Bank branch closures, Bank digitalization, Bank efficiency, COVID-19

This article examines how COVID-19 has affected, and may continue to affect, bank branches operations by examining closures in urban and rural counties. The net number of bank branches has been steadily declining since 2009 (Stackhouse, 2018), and recent industry publications have reported an acceleration of branch closures and a shift from branch banking to digital channels due to COVID-19 (Alix, 2020). In the information-intensive industry, bank closures, even in crowded markets, are shown to decrease local credit supply as lender-specific relationships are hard to replace (Nguyen, 2014). We also see evidence of branch closure clusters (Simpson and Buckland, 2016; Tranfaglia, 2018), but most research examining local effects is focused on suburbs and metropolitan areas. Others find that in locations underserved by traditional banking institutions, alternative financial service providers (AFSPs) like check cashing outlets, payday lenders, and other relatively high-priced services fill the financial void (Simpson and Buckland, 2016; Smith, Smith, and Wackes, 2008). These issues of credit access, retail banking prices, and financial voids may be exacerbated as online and mobile banking continue to take hold, especially in a post-COVID-19 world. To understand how we might expect banks to operate their branch networks into the future, this article examines how digital banks have handled branch operations in the past and during the first year of the pandemic.

Measuring Bank Digitalization

COVID-19 has hastened technological adoption in many spheres. We observe advances in remote work, with education being particularly quick to adapt and adopt new technologies. Banking and other financial services are also experiencing accelerated digitalization (Deloitte, 2020). The efficiency ratio can be used as a proxy for the level of bank digitalization. The efficiency ratio is defined as total overhead expense expressed as a percentage of net interest income plus noninterest income. Total overhead expense includes salaries and employee benefits, expenses of premises and fixed assets, and other noninterest expense divided by average assets. We expect that digital banks may have lower efficiency ratios, as adopting new technologies may reduce noninterest expenses. This is not a perfect measure, and more research is needed on creating measures of bank digitalization, but we do see evidence that banks which adopt Internet delivery channels and other online features exhibit measured improvements in financial performance (Acharya, Albert, and Srinivasa, 2008). This increased performance also reflects increased efficiency through reduced staffing costs and other noninterest expense (Hernando and Nieto, 2007). The efficiency ratio also allows for standardized bank comparisons across multiple asset classes and is sourced from the Federal Financial Institutions Examination Council's (FFIEC's) Uniform Bank Performance Report (UBPR), which aggregates publicly reported bank financial data. Limitations to this proxy and alternative measurements are discussed in the concluding section of this article.

Bank Digitalization and Branch Operations

Because of rapid digitalization, we might expect that branch operational decisions of the most digitalized banks in the past may reflect branch operations during COVID-19 as well as the post-pandemic period. To investigate the relationship between bank digitalization and branch operational decisions, I organize banks into quintiles based upon their second quarter (Q2) 2009 efficiency ratios. The Dodd–Frank Act, drafted in the second half of 2009 and passed into law in 2010, influenced commercial banks operational and asset allocation decisions (Bouwman, Hu, and Johnson, 2018) and increased efficiency ratios; that is, it made them less efficient, largely due to increased compliance costs (Deacle, 2017). As such, Q2 2009 is chosen to be the base-year for measuring bank digitalization as it should be more representative of banks making the proactive decision to adopt digital technologies before being compelled to find efficiencies. That is, banks choosing to adopt a digital platform by 2009 were more likely to have

done so by their own volition. For behavior during COVID-19 and looking forward, I organize banks into quintiles based on their Q2 2019 efficiency ratios.

To complete the analysis, I use annual Federal Deposit Insurance Corporation (FDIC) bank branch data to examine how the most and least digital banks in Q2 2009 operate their branch networks throughout the decade ending in Q2 2019, as well as their behavior from Q2 2019 to Q2 2020. Due to the June 30 deadline for annual branch reporting and the persistence of COVID-19 throughout the year, the reported statistics are expected to be a lower bound on bank closures due to the pandemic. I dichotomize the branch activity into urban and rural counties, with urban being defined by the U.S. Census Bureau's definition of metropolitan statistical areas, and I summarize branch closures by digitalization quintile.

Results: Highly Digital Banks Close More Branches and COVID-19 Has Accelerated Digitalization

We see in Table 1 that more digital banks closed a larger share of their branches over the period 2009 to 2019. This result holds in both urban and rural areas, but the closures are more pronounced in urban areas, consistent with findings that online banking adoption is clustered (Hernández-Murillo, Llobet, and Fuentes, 2010) and branch closures are clustered (Tranfaglia, 2018). The annual closure rate is a ten-year average of closures per year; fully 25% of all urban branches that existed in 2009 closed by 2019; at the same time, 18% of rural branches closed. These results suggest that the COVID-19 pandemic resulted in further incentives for technological adoption, the implication being that we should expect more bank branch closures. Further, these closures will likely be concentrated among the most digital banks. Indeed, we see in Table 2 that efficiency ratios decreased from Q2 2009 to Q2 2019 at an average annual rate of 0.94 percent; in the early months of the pandemic, from Q2 2019 to Q2 2020, we see a higher-than-average annual decrease of 1.76%. With the efficiency ratio as our proxy for digitalization, these results indicate the adoption of digital technologies at banks is accelerating.

Table 3 displays similar trends for bank closures based on 2019 bank digitalization scores. The second

Table 1. Historical Bank Digitalization and Branch Closures, 2009-2019

	Branch Closures			
Digitalization Quintile	**Urban**		**Rural**	
1 (most digital)	7,524	41%	1,159	33%
2	3,210	18%	700	20%
3	2,316	13%	676	19%
4	2,616	14%	553	16%
5 (least digital)	2,647	14%	460	13%
Total closures	18,313	100%	3,548	100%
Total 2009 branches	72,277		19,597	
Annual closure rate	2.53%		1.81%	

Source: FFIEC, FDIC; digitalization proxied using efficiency ratios.

Table 2. Efficiency Ratio (ER) Quintile Cutoff Points

Digitalization Cut-offs	Q2 2009	Q2 2019	Q2 2020	Annual Average Change (2009–2019)	COVID-19 Change (2019–2020)
1	0.0	0.0	0.0	-0.47%	-1.37%
2	58.5	55.7	55.0	-0.65%	-1.73%
3	67.8	63.4	62.3	-0.90%	-1.61%
4	77.3	70.3	69.2	-1.42%	-0.34%
5	91.7	78.7	78.4	-1.28%	-3.74%
Average ER	80.7	70.4	67.8	-0.94%	-1.76%

Source: FFIEC.

Table 3. COVID-19 Bank Digitalization and Branch Closures, 2019-2020

	Branch Closures			
Digitalization Quintile	**Urban**		**Rural**	
1 (most digital)	712	33%	119	31%
2	836	39%	132	34%
3	274	13%	56	15%
4	226	10%	51	13%
5 (least digital)	121	6%	24	6%
Total closures	2,169	100%	383	100%
Total 2019 branches	68,311		18,081	
Annual closure rate	3.18%		2.12%	

Sources: FFIEC, FDIC; Digitalization proxied using efficiency ratios.

digitalization quintile holds the largest share of bank branch closures, suggesting that the most digital banks are achieving optimization in their branch networks. We also observe that a larger share of branches closed between 2019 and 2020 than the average closure rate for the preceding decade, implying that COVID-19 has contributed to a relatively high number of branch closures. These results are only representative of the first few months of the pandemic and serve as a lower bound on closures; several banks permanently closed branches that were not reflected in the June 30 FDIC reporting (Alix, 2020; Guilas, 2020).

Conclusion

Highly digital and efficient banks close bank branches at a significantly higher rate than those that are less digital and efficient. In both urban and rural areas, there was a larger-than-average annual increase in bank branch closures from Q2 2019 to Q2 2020, encompassing the beginning months of the pandemic. We also observe that COVID-19 has accelerated digital transformation and initiatives to increase bank efficiency, as measured by the efficiency ratio, at an annual rate much faster than average over the previous decade. As such, we can expect that COVID-19 will continue to increase the number of bank branch closures in the coming years, as at least several individual banks have already indicated. Although closures now outpace openings on net, an extension to this paper could incorporate branch opening behaviors and a spatial component to examine the locations of branches owned by digital and nondigital banks. Doing so would help answer questions about access to financial services more comprehensively.

This article uses the efficiency ratio as a proxy for bank digitalization. It is an imperfect measure, but it does capture many of the noninterest expenses associated with running a large branch network. Future research should explore alternative measures of bank digitalization; these might include current public data such as average personnel expense per employee, assets per employee, occupancy expense ratios, transactional functionality of bank websites, and others. Future work should seek to determine the best way to measure bank digitalization by using publicly available data.

Another limitation that should be addressed in future research, particularly relating to rural credit markets, is that of mergers and acquisitions (M&A). Although the financial metrics used in this paper normalize all banks using income and assets, M&A activity may influence efficiency ratios and branch closures in ways unmeasured by this paper. Are banks that adopt digital technologies more likely to remain independent over time? What happens to the branches of acquired rural banks, and do operational decisions differ if the acquiring bank operated primarily in urban or rural banking markets beforehand?

Finally, there is a need to better understand how bank digitalization and continued branch closures affect access to credit and other banking services. Will digital technologies replace the nuanced information gathering conducted by a hometown lender? And what is the role of bankers and policy makers to ensure equitable access to low-cost credit in the face of these industry-wide transformations? The answers to these questions provide many avenues for future research on regional banking and affected communities.

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COVID-19 and Rural Broadband: A Call to Action or More of the Same?

Brian E. Whitacre

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Keywords: Broadband policy, COVID-19, Rural

The COVID-19 pandemic brought with it an unprecedented transition in the way that most Americans live. Social distancing, stay-at-home orders, school closures, and restrictions on business operations led to an increasing dependence on Internet access to accomplish everyday tasks like working, learning, and accessing healthcare. This reliance on an Internet connection brought an immense amount of attention to individuals and households without one—including calls to increase both the availability and affordability of broadband Internet access (Brake, 2020; Garcia and Smith, 2020; Stewart, 2020). This topic is a particularly important one for rural communities, where rates of broadband availability and adoption have long lagged behind those in urban areas. This paper paints a general picture of broadband progress in rural America prior to the COVID-19 pandemic, summarizes the broadband-related legislation passed as part of the response, and highlights rural experiences with schooling and healthcare during the transition to a more online-dominant environment. It emphasizes (1) the "homework gap" that was exacerbated during school shutdowns, and the approaches rural districts used to address it; and (2) the increase in telehealth seen during the pandemic, including variations in use by rural and urban residents. The results show that policy efforts geared toward improving broadband availability and use had only a small impact in the near term and that rural areas continue to be at a disadvantage in a world where more interactions are taking place online.

Background and Existing Research

This is not a new topic. Broadband connectivity has the potential to influence nearly all aspects of rural life, including providing larger markets for small businesses, offering alternative ways of income generation for areas with few traditional businesses, allowing rural students to experience a wider array of educational opportunities, improving the scope of available health care services, raising farm profits via the use of precision agricultural techniques, and allowing access to a broader array of social interaction than is typically available in a small town. Rural development practitioners have for years emphasized the importance of broadband in many of these arenas (Parker, 2000; LaRose et al; 2007; Stenberg et al., 2009; Dickes, Lamie, and Whitacre, 2010; Whitacre et al., 2014a). However, the data continue to paint a strikingly familiar picture: rural areas lag behind their urban counterparts in the availability and adoption of broadband, gaps commonly referred to as the rural-urban version of the "digital divide." The issue is widespread: Even before the pandemic, 58% of rural Americans believed that access to high-speed Internet was a problem in their area (Anderson, 2018).

Economic theory predicts that rural areas will be the last to be served by Internet Service Providers (ISPs). With low population density, rough terrain, and lower levels of characteristics that often predict adoption (education, income, youth), rural locations offer a smaller return on investment than their urban counterparts. Installation costs vary by technology and can be expensive, with a mile of fiber optic cable averaging $27,000 (U.S. Department of Transportation, 2017). In some cases, the predicted profits may not cover the costs of installation, which is why these locations remain without a private provider of Internet access. Figure 1a demonstrates the progress that has been made since 2014 in connecting rural parts of the United States but also shows that significant gaps remain. The latest data, from 2019, show that 17.3% of rural residents lack access to the official Federal Communications Commission (FCC) definition of broadband (25 megabits per second (Mbps) download, 3 Mbps upload), compared with only 1.2% of urban residents. Figure 1b shows that the discrepancy is even more pronounced for faster speeds (250 Mbps download, 20 Mbps upload), where nearly half of all rural residents do not have such a connection available to them. Lai and Widmar (2021) use county-level speed test data to document an unsurprising negative correlation between download speeds and the degree of rurality during the initial phase of the pandemic.

Figure 1. Percentage of Population with Fixed Terrestrial Broadband Access 2014–2019, by Rural/Urban Status

Figure 1a. 25 Mbps Download/3 Mbps Upload

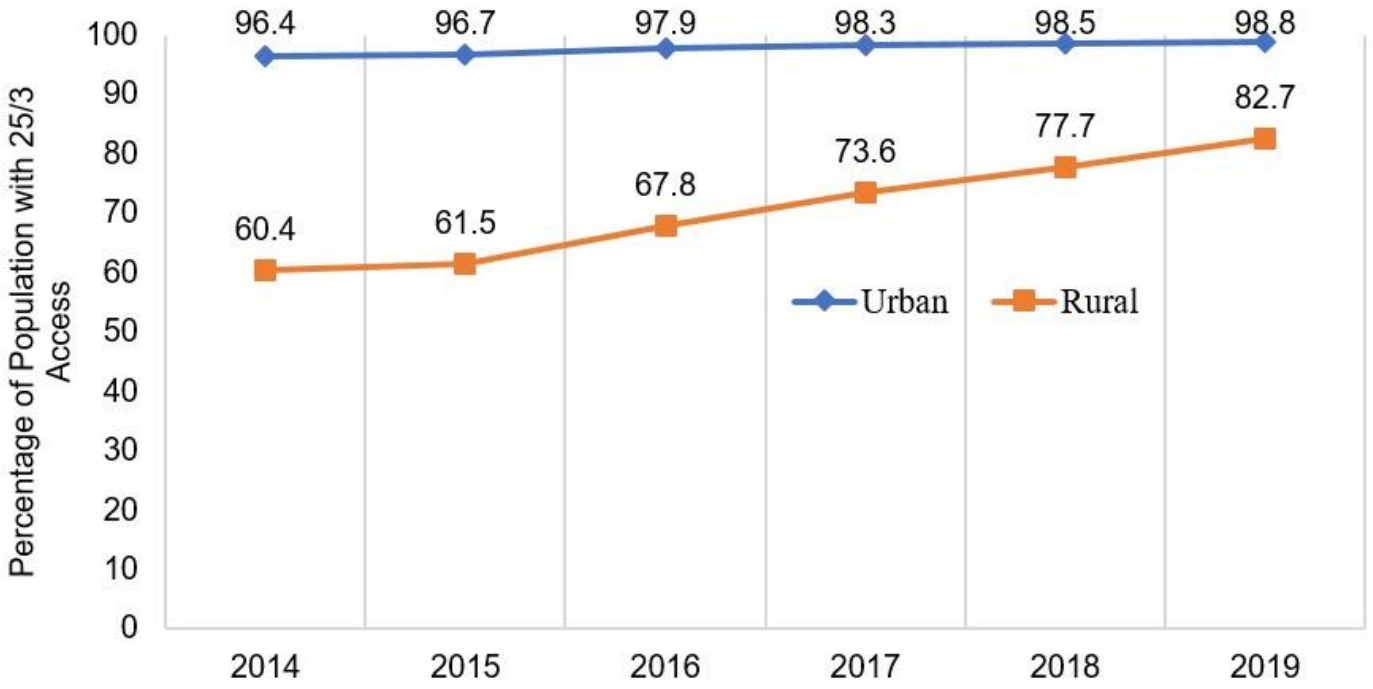
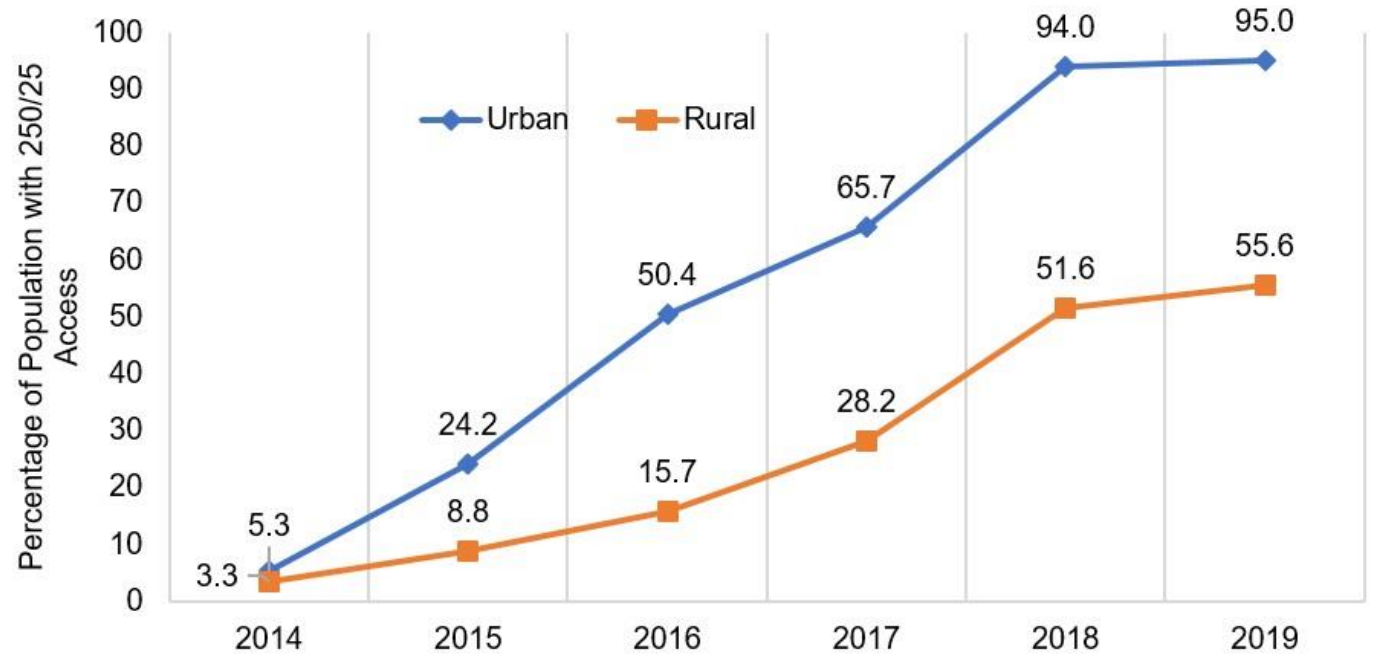


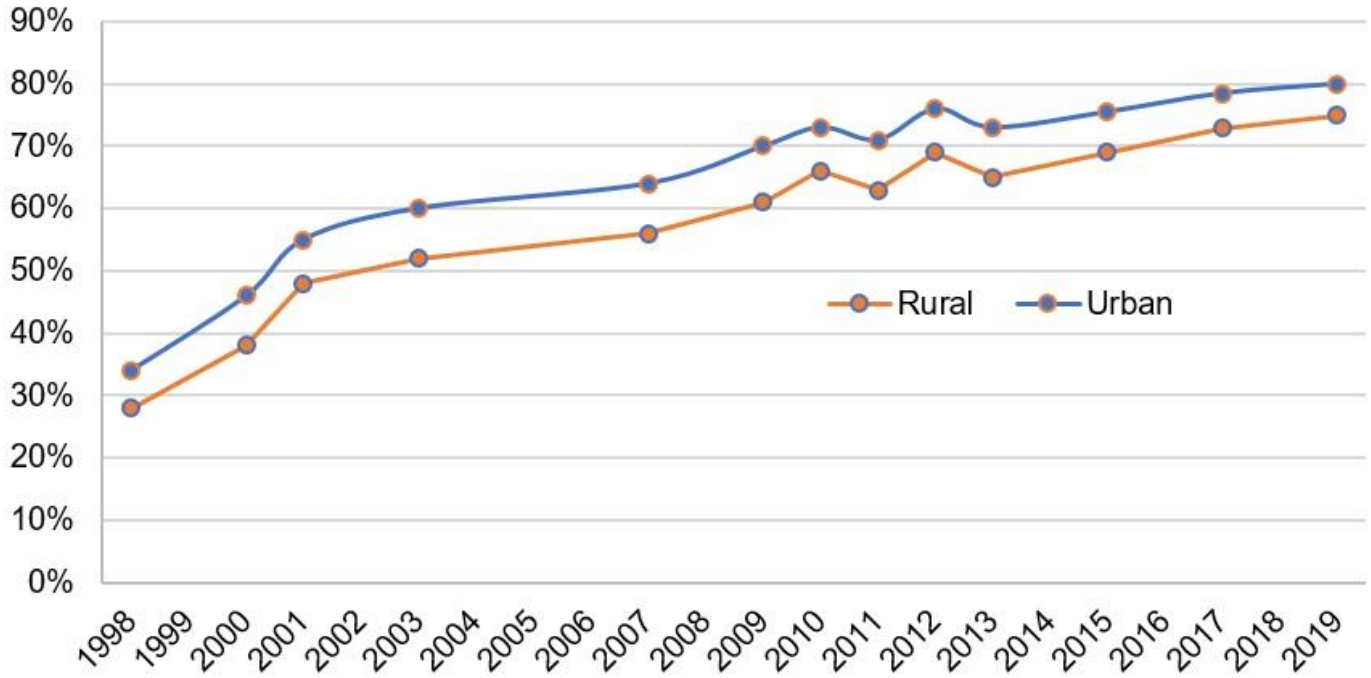
Figure 1b. 250 Mbps Download/25 Mbps Upload



Note: The FCC defines "rural" at the census block level, consisting of places with fewer than 2,500 people.
Source: FCC (2021).

Rural residents also lag in terms of broadband *adoption* (i.e., paying for monthly service). The National Telecommunications and Information Administration (NTIA) documents a persistent 5–10 percentage point gap between rural and urban residents for Internet use (any speed) over the period 1998–2019 (Figure 2). The FCC (2021) confirms that this holds specifically for 25/3 broadband, with household adoption rates of 73.3% for urban areas and 64.3% for rural ones as of 2019. Research has shown that roughly 40% of this broadband

Figure 2. Internet Use from Any Location, by Rural/Urban Residence



Note: The NTIA's definition of "rural" follows the Office of Management and Budget and uses county classifications where counties that are not part of a metropolitan statistical area are considered rural.
Source: NTIA (2020).

adoption gap is due to lower infrastructure availability in rural areas (Whitacre, Strover, and Gallardo, 2015). Socioeconomic characteristics such as age, income, and education are the main drivers behind the remaining 60%, leading to calls for demand-oriented policies that cater to lower-adopting demographics (Reddick et al., 2020).

A growing field of research has examined what broadband can mean for rural communities. Gallardo, Whitacre, and Grant (2017) summarize the literature, focusing on broadband's impacts on economic development, civic engagement, education, telework, telehealth, and agriculture. While there is a general consensus that broadband is associated with positive outcomes in rural areas, a point of contention is whether *availability* or *adoption* matters more. Kim and Orazem (2017) show that the rollout of broadband *availability* during 2000–2002 was important for rural firms' location decisions in Iowa and North Carolina, and Mack (2014) finds a link between broadband speeds and rural establishments in Ohio. There is also evidence that broadband availability is positively associated with rural in-migration (Mahasuweerachai, Whitacre, and Shideler, 2010), housing values (Deller and Whitacre, 2019), and farm sales and profits in rural counties (Kandilov et al., 2017). Finally, one recent study demonstrated that increasing broadband penetration was associated with increases in corn yields and lower farm operating expenses (LoPiccalo, 2020). Others have argued, however, that rural broadband *adoption* is more relevant—both for economic outcomes such as income and job growth (Whitacre, Gallardo, and Strover, 2014a,b) and for civic engagement (Whitacre and Manlove, 2016). The latter body of work makes the case for more demand-oriented policies such as subsidized broadband subscriptions or digital inclusion training; this is in direct contrast with the majority of previous federal policies, which focused exclusively on broadband infrastructure supply (Kruger, 2019).

Against this background—particularly the lower broadband availability and adoption rates in rural America—this paper explores the policy response to COVID-19 and assesses impacts to schoolwork and healthcare access.

Broadband Policy and COVID-19

The federal response to the COVID-19 pandemic included two distinct stimulus packages. The first was the $2.2 trillion Coronavirus Aid, Relief, and Economic Security (CARES) Act, which was signed into law on March 27, 2020. Several aspects of the CARES Act focused on broadband access and use, including (1) $13.5 billion in formula grants to states, which in turn distributed 90% of the funds to local K–12 educational agencies to support online learning; (2) $200 million to the FCC's COVID-19 Telehealth Program; (3) $100 million for the U.S. Department of Agriculture's ReConnect grant program for rural infrastructure; and (4)

$50 million to the Institute of Museum and Library Services for digital inclusion projects (Taglang, 2020). During the first several months of the pandemic, more than 800 companies signed the "Keep Americans Connected" pledge indicating they would not terminate Internet service due to an inability to pay and would waive late fees (FCC, 2020). However, this pledge only ran through June 2020, and the ReConnect funding came with the caveat that all work be completed by the end of 2020—a difficult task when similar projects typically require months of planning (Bode, 2020).

The second stimulus package, a $900 billion measure passed in conjunction with the Consolidated Appropriations Act in December 2020, took a notably different approach to broadband (Kelly, 2020; Brodkin, 2020). It included $3.2 billion for $50-per-month subsidies to provide broadband access for low-income households or those laid off during the pandemic. This is a sizeable increase to the roughly $1 billion paid out annually under the FCC's Lifeline program, which offers only a $10/month broadband subsidy for low-income households. This funding also allows participating Internet service providers to be reimbursed up to $100 for one laptop, desktop, or tablet per household. The bill also provides $1 billion for Tribal broadband programs, $300 million in rural broadband infrastructure grants, $250 million for telehealth programs, and $98 million to improve broadband mapping.

The Homework Gap

Even before the pandemic, the "homework gap"—the distinction between those K–12 students with high-speed home Internet service and a computer and those without—was sizable. Recent reports estimated that 15–17 million (30%) of school-age children lived in households without either a connection or a device adequate for distance learning (Chandra et al., 2020; Horrigan, 2020a). This percentage was roughly the same in rural and urban areas (Opalka et al., 2020). As schools transitioned to an online environment, the problem became more glaring. The biggest portion ($13.5 billion) of the broadband-related funding in the CARES Act went to support online learning for school districts in light of this situation. This money was largely used to provide wireless hotspots and laptops/tablets to households lacking such devices. However, a study completed in June 2020 found that during the early months of the pandemic, only 28% of rural schools were able to provide hotspot access for their students, compared to 48% for urban schools (Gross and Opalka, 2020). The gaps were even larger for the provision of laptops or tablet devices (48% rural, 85% urban). This report also noted that rural districts were much less likely to take attendance or monitor engagement during this time. In August, 65% of rural school districts were planning on returning to fully in-person classes for the fall, much higher than the 9% rate in urban districts (Gross, Opalka, and Gundapaneni, 2020). This was prior to the fall wave of the pandemic that hit the more rural parts of the country heavily and suggests that many districts may have been unprepared for longer-term distance learning.

Evidence also suggests that the federal funding to support online learning was not particularly effective at bridging the Internet portion of the homework gap during the latter part of 2020. Horrigan (2020b) notes that Census Pulse surveys can be used to identify how successful these efforts have been. This data demonstrates that between May and December 2020, the percentage of student households indicating that the Internet was always available for educational purposes essentially stayed flat at 73% (Figure 3a). It does appear that school districts were more successful at getting computers to their students, as the percentage of student households with a device always available to them increased from 70% to 78% during that time (Figure 3b). The surveys (which unfortunately do not break out rural/urban status) also asked about who provided the computer/Internet service. By December, 61% of households with K–12 students had a computer that was provided by the child's school, but only 4% indicated that their Internet service was paid for by the school (Figure 4).

Some rural districts went beyond trying to provide hotspots to their students to address the connectivity issue. Such efforts included creating maps of places in the local community with free wi-fi; helping families to connect with low-cost Internet options; upgrading the school's wi-fi to reach the parking lot with sufficient bandwidth for multiple students; constructing workspaces in school parking lots; and even parking wi-fi enabled buses in rural communities (Nicola, Gable, and Ash 2020; Thompson, 2020). Some districts reported loading prerecorded lectures onto USB drives or hand-delivering paper packets and then communicating via phone and text.

It is too early to know whether the more recent stimulus broadband funding—with its $50/month subsidies—will have a meaningful impact on the homework gap in rural areas. Digital inclusion advocates have argued that affordability, and not infrastructure availability, is the biggest barrier to increasing adoption rates. This holds for rural areas as well: Over 60% of rural households earning less than $20,000 had no broadband subscriptions of any type in 2017, compared to only 14% of those earning $75,000 or more (NDIA, 2019).

Telehealth

Another large shift in everyday life during the COVID-19 pandemic was the transition to online access for healthcare. Many doctors and hospitals cut back dramatically on in-person visits—and the use of telehealth (typically defined as the delivery of health care via remote technologies) quickly accelerated. Medicare and Medicaid rapidly loosened their restrictions on the types of telehealth visits allowed and where the visits

Figure 3. Computer and Internet Availability for Households with K–12 Students, April–December 2020

Figure 3a. Internet Availability for Households with K–12 Students

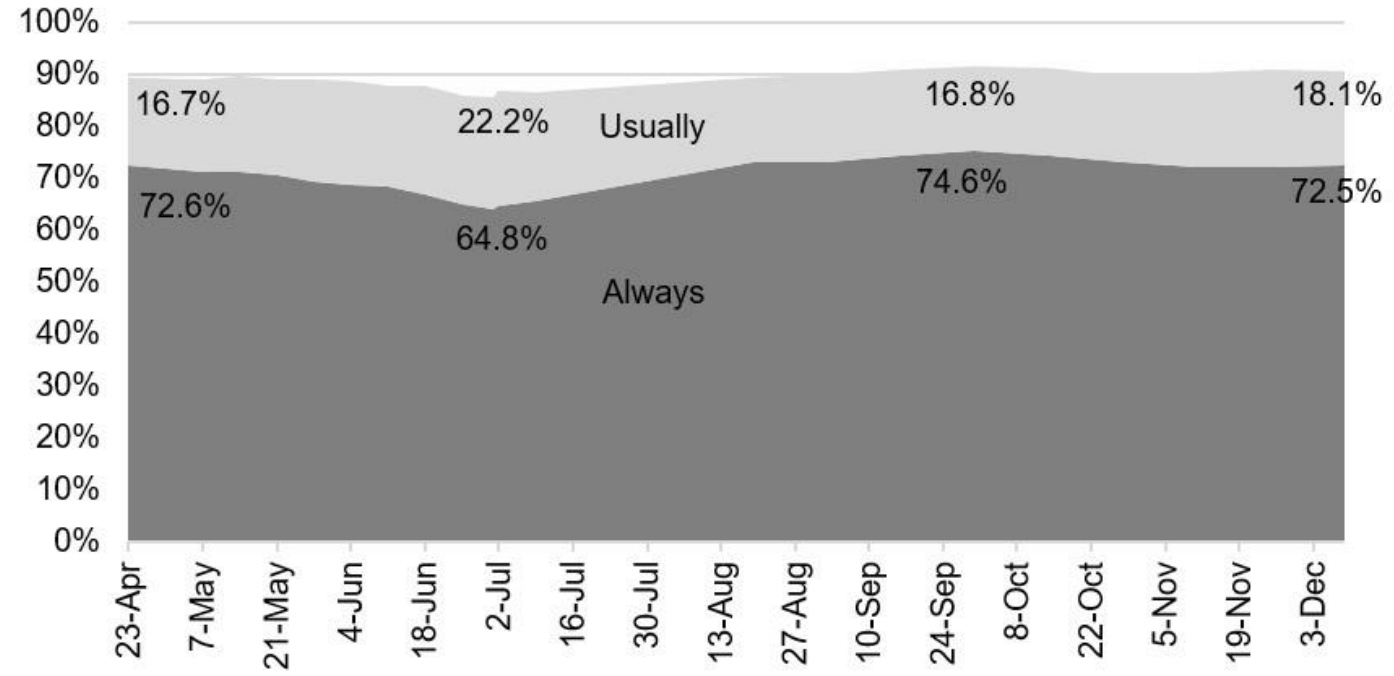
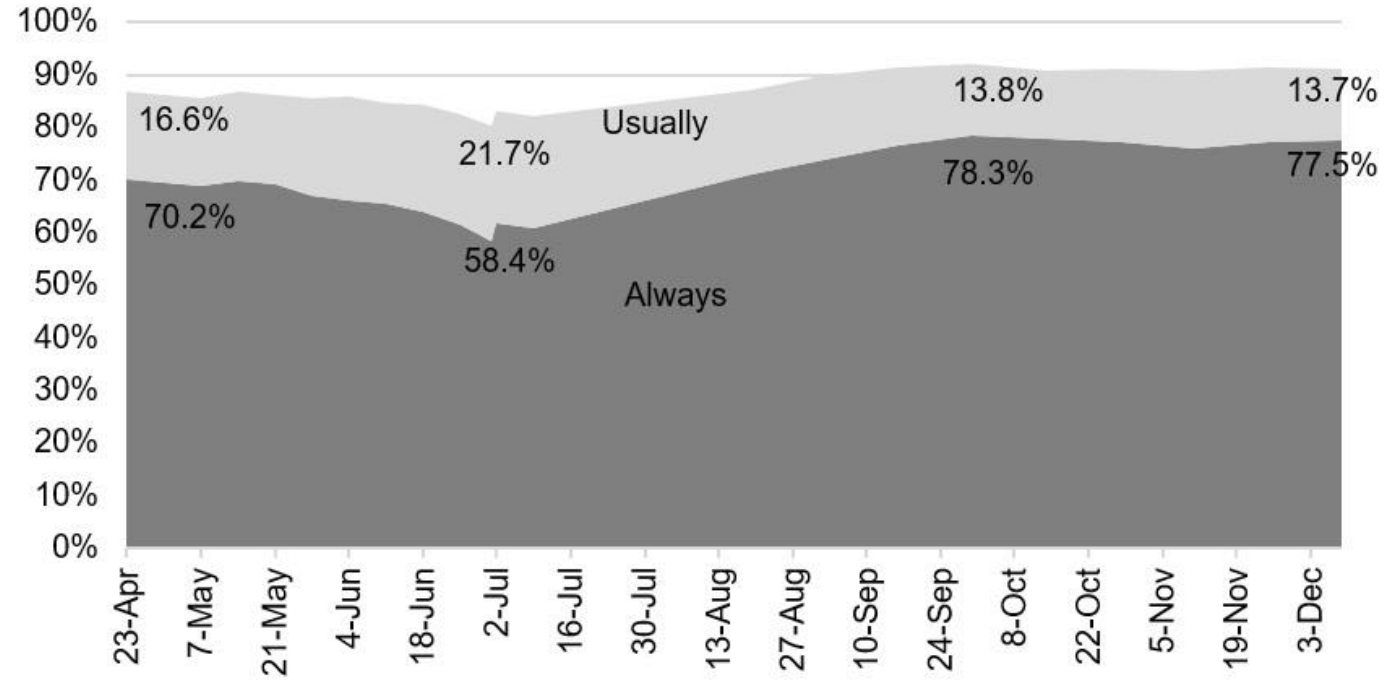


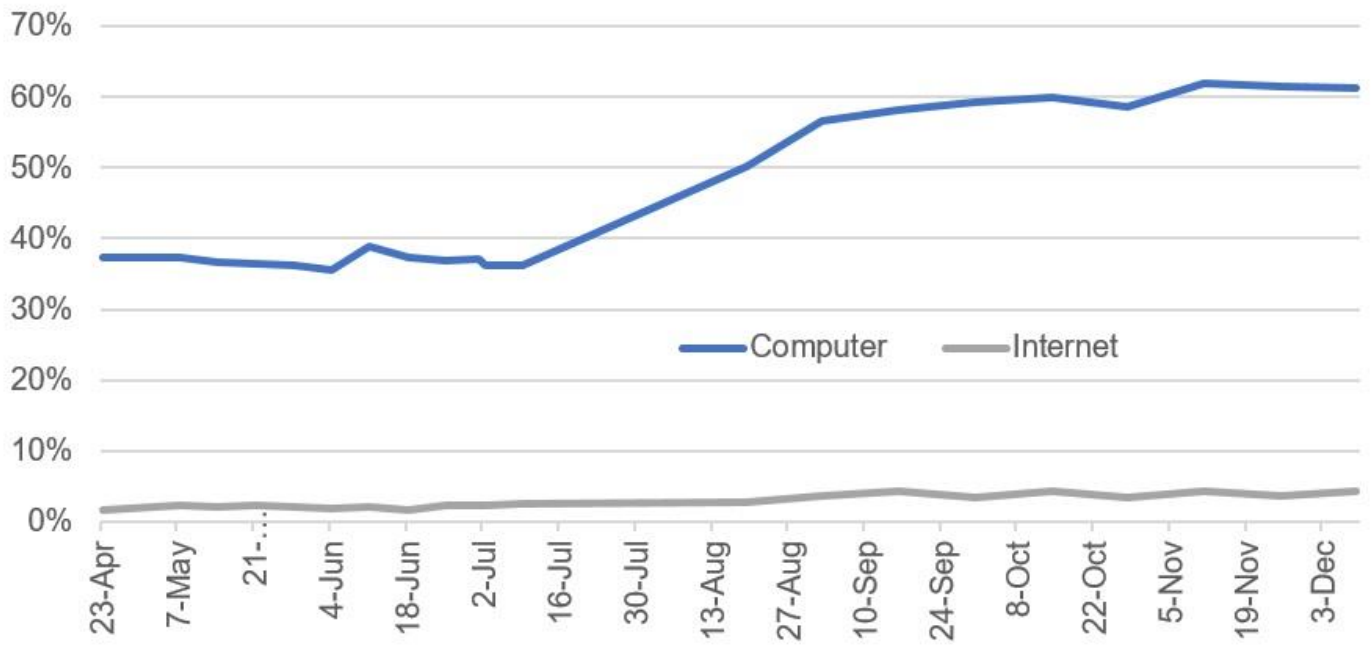
Figure 3b. Computer Availability for Households with K–12 Students



Source: U.S. Census Household Pulse Surveys Weeks 1–21 (2020), Education Table 3: "Computer and Internet Availability in Households with Children."

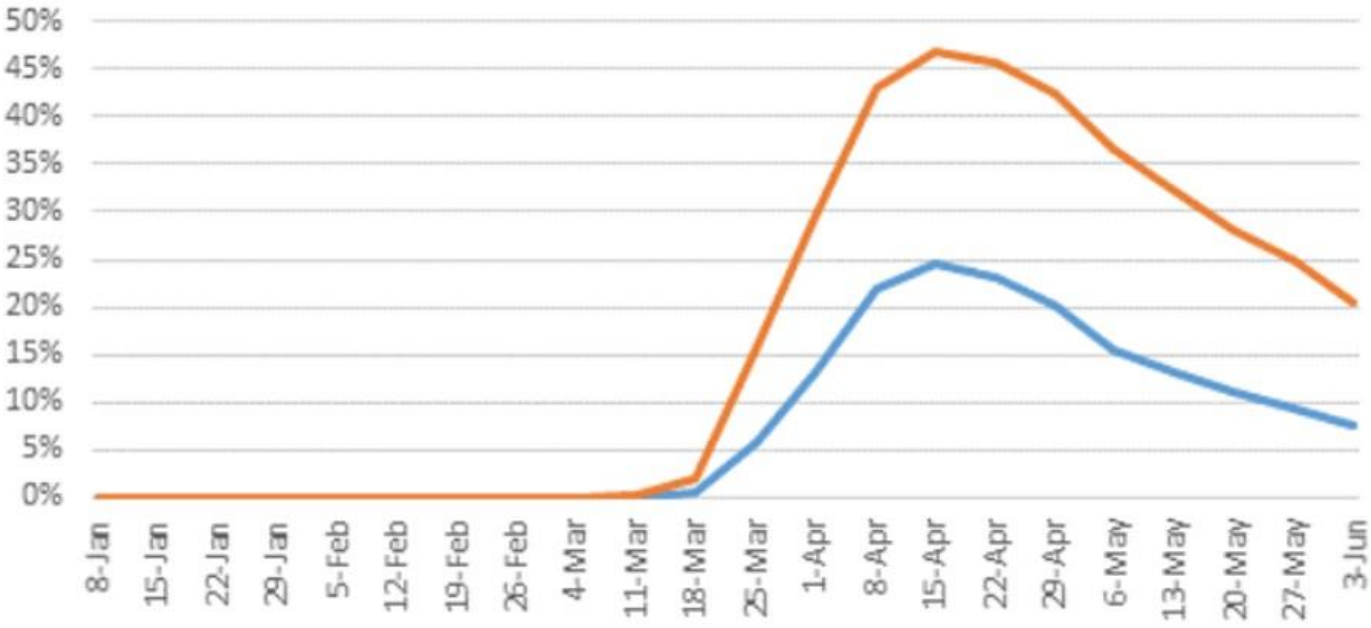
could take place (CMS, 2020). However, researchers were quick to voice concern that rural constituents might be left behind during this change (Hirko et al. 2020; Ramsetty and Adams 2020). Broadband access was a particular worry: Prior evidence noted that the gap in connection speeds between rural and urban physician offices has been increasing over time (Whitacre, Wheeler, and Landgraf, 2017) and that broadband availability was an important determinant of telehealth use (Wilcock et al., 2019; Drake et al. 2019). The limited

Figure 4. Percentage of Households with K–12 Students Provided with Computers/Internet Access from Schools, April–December 2020



Source: U.S. Census Household Pulse Surveys Weeks 1–21 (2020), Education Table 3: "Computer and Internet Availability in Households with Children."

Figure 5. Telehealth Weekly Visits as a Percentage of Total Medicare Primary Care Visits in Urban versus Rural Counties, January–June 2020



Source: Bosworth et al. (2020).

data available from health encounters after the pandemic suggests that this concern is valid: Telehealth visits rose from less than 1% of all Medicare primary care visits in February 2020 to nearly 50% in urban areas by mid-April but only comprised 25% of visits in rural locations (Bosworth et al., 2020) (Figure 5).

Another study, comparing health encounters between March 2019 and March 2020, showed that living in a rural area decreased the likelihood of telehealth use at the onset of the pandemic (Jaffe et al., 2020). Thus, rural areas seemed to be participating less in telehealth during the early phases of the pandemic.

The federal government expanded reimbursements for telehealth services and provided a significant amount of funding (in both stimulus packages) to support telehealth efforts. This includes financial support to clinics in underserved communities, such as those in rural locations. It also funded connected devices—such as tablets, smart phones, or monitoring devices—that may not require traditional wireline broadband access (and instead use cellular service). However, adopting this new method of healthcare is dependent on the health and digital literacy of the populations being served. Rural America typically lags behind its urban counterparts on both of these topics, so simply paying for connected devices is not likely to solve the underlying issues. Many rural providers have recognized this—along with local broadband availability issues—and offered traditional phone calls in lieu of video appointments (Hirko et al., 2020).

Conclusion

The COVID-19 pandemic brought with it a clear realization of the importance of broadband and put those without such a connection at an even bigger disadvantage than they faced in a non-socially distanced world. Two integral parts of our society—going to school and obtaining health care—largely transitioned to online environments during this time. Rural residents, with lower levels of broadband availability and adoption, faced additional difficulties during this change. While the federally funded stimulus packages have included significant broadband components, they do not appear to have meaningfully impacted these elements during the early part of the pandemic: Very few homes with school-age children reported having their Internet service paid for by an outside source, and rural residents remained less likely to use telehealth. The lessons learned include that addressing the digital divide is not a short-term process: A quick infusion of cash cannot roll out wireline infrastructure in just a few months, and it appears to be much more difficult to deliver home Internet service to students than it is to provide them with computers (Horrigan, 2020b). Nonetheless, the COVID-19 broadband funds are unique in that they recognize both the availability and adoption components of the divide. The $50 monthly broadband subsidy is an important change from previous policies, telehealth funds can pay for connected devices (not available under earlier policies) to receive health care at home, and the infrastructure funding builds on prior federal efforts.

Broadband will continue to be an important topic for rural communities in a post-pandemic society. While this article focused on schooling and healthcare, other components of rural life are also clearly linked to broadband availability and use. In particular, the ability to work from home is vital for increasing opportunities for rural workers and allowing for in-migration of urban workers who are geographically flexible. There are also implications for civic engagement, housing values, and agricultural productivity. COVID-19 pushed the broadband policy envelope forward, but largely failed to deliver short-term results for rural residents. Whether impacts are seen over the longer term remains to be seen.

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