FIRST QUARTER 2020

ECON FOCUS

FEDERAL RESERVE BANK OF RICHMOND

EDUCATION WITHOUT LOANS

Income share agreements are a new way to pay

The Virus and the Economy

How Rural America Got Electricity

Interview with Joshua Angrist

ECON FOCUS

VOLUME 25
NUMBER 1
FIRST
QUARTER 2020

Econ Focus **is the economics magazine of the Federal Reserve Bank of Richmond. It covers economic issues affecting the Fifth Federal Reserve District and the nation and is published by the Bank's Research Department. The Fifth District consists of the District of Columbia, Maryland, North Carolina, South Carolina, Virginia, and most of West Virginia.**

Published by
the Federal Reserve Bank
of Richmond
P.O. Box 27622
Richmond, VA 23261
www.richmondfed.org
www.twitter.com/
RichFedResearch

Subscriptions and additional copies: Available free of charge through our website at www.richmondfed.org/publications or by calling Research Publications at (800) 322-0565.

ISSN 2327-0241 (Print)
ISSN 2327-025X (Online)

FEATURES

DEPARTMENTS

COVER ILLUSTRATION: TIMOTHY COOK

What We Don't Know about What's Next

Every American is aware by now of the sudden, unparalleled economic changes created by the coronavirus and the public health measures taken to contain it. These changes have created major economic uncertainty for households and businesses. And uncertainty has, as it often does, made a bad situation worse: Confidence in the future, or the lack of it, is a key driver of consumer and business spending and investment decisions. For economic policymakers, then, the atmosphere of uncertainty creates new challenges in understanding the environment and anticipating the economy's path.

At the Richmond Fed, we've therefore greatly stepped up our engagement with our business and community contacts to gauge how uncertainty is playing out. We've been combining this work with our economic research to understand more precisely where our economy is going. (You can read about these efforts on p. 7.) At this early stage in what may well be a difficult process of recovery, I would like to share with you not what policymakers know, but what we don't know about several major areas of uncertainty.

The most important area of uncertainty, as I see it, is medical rather than economic: What will be the path of the virus in reaction to our public health responses? What infection and recovery rates will we see?

The biggest *economic* uncertainty is consumer confidence. Consumer spending is two-thirds the size of GDP — and no one knows at this point how consumers are going to behave after they receive the "all clear" or "mostly clear" to resume their full range of day-to-day activities. Will we see a lot of pent-up demand for going out, for retail shopping at brick-and-mortar stores, for taking vacations? Or will the habits developed during the lockdowns, plus lingering caution, keep these areas of the economy highly depressed? Right now, the sinking consumer confidence that we have seen in the data concerns me. Although we will see early indications of the future of consumer behavior as some states relax their restrictions, those short-term reactions, whichever way they fall, might not be reliable guideposts for the longer term or for the country as a whole.

Second, just as we don't know how quickly consumers will come back, we don't know when the lost jobs will come back — or in what form. Will dislocated service workers, for example, struggle for a long time to enter new occupations? As work arrangements shift, will parents have a harder time finding ways to balance work and home needs?

Another significant area of uncertainty is the future shape of credit markets. The Fed has put numerous programs in place during the crisis to support the ability of banks, and the financial system in general, to lend. (These programs are listed on p. 6.) Congress has done so as well. Moreover, the banking system remains healthy at this point, unlike in 2008. But many assets of financial institutions are likely to remain under stress for some time, including both consumer debt and the debt of highly levered businesses. Banks in the United States hold more than $2.3 trillion in commercial real estate loans, making this sector worth watching closely; in addition to the uncertainty of the retail component, we have new uncertainty as to the future demand for office space. After the immediate crisis has passed, it's unclear whether the banks will be in a weaker position — and what implications this will have for access to credit.

A fourth major area of uncertainty is what economists call "wealth effects." Research at the Richmond Fed and elsewhere tells us that sudden, unexpected changes in wealth can have major effects on individuals' behavior on a variety of fronts, such as postponing retirement decisions and reducing consumption, charitable giving, and entrepreneurship. As I write these words, stock market values have rebounded to a large extent after a period of sharp decline — but of course, this could change. Moreover, other forms of household wealth, such as housing, could see meaningful declines. And the massive job losses that have occurred will result in drawdowns of household savings and increases in debt. All in all, the crisis is likely to translate into negative wealth shocks — and into wealth effects.

These are some of the longer-term economic issues that have been on my mind. I am confident that we will eventually regain our prosperity, but we have much to learn about how our economy will change along the way. **EF**

TOM BARKIN
PRESIDENT
FEDERAL RESERVE BANK OF RICHMOND

Share this article: https://bit.ly/after-crisis

UPFRONT

Regional News at a Glance

BY KATRINA MULLEN

MARYLAND — Gov. Larry Hogan issued an executive order on April 3 halting evictions, repossessions, and foreclosures of those who are having trouble paying due to COVID-19. This followed a March 16 executive order prohibiting companies from shutting off or charging late fees for electricity, gas, water, sewage, phone, cable television, and internet. In addition, the Maryland Department of Agriculture has designated farmers markets as essential, urging them to stay open to support those who depend on local fruits and vegetables, including Supplemental Nutrition Assistance Program recipients.

NORTH CAROLINA — Gov. Roy Cooper, along with the State Board of Education and the North Carolina Department of Public Instruction, allocated $50 million to support remote learning, child care services, and meals while public schools are closed. Executive Order No. 117 (public school closures), issued March 14, formed the North Carolina COVID-19 Education and Nutrition Working Group to strategize and ensure the health and safety of those seeking food and child care. The local education agencies, composed of 115 school districts, have also been given the authority to use existing funds for other needs, such as disinfecting schools and buses and obtaining protective equipment for personnel.

SOUTH CAROLINA — The South Carolina Department of Labor, Licensing, and Regulation has extended licenses, registrations, and permits renewals for various boards (appraisers, engineering and surveying, long-term health care, nursing, residential builders, etc.) until Sept. 30. To keep up with the increased demand for health practitioners during the COVID-19 pandemic, South Carolina's Board of Medical Examiners and the Board of Nursing have accepted "emergency" licenses, which allow out-of-state physicians, physician's assistants, and respiratory care practitioners to offer their services temporarily.

VIRGINIA — The Department of General Services' Division of Consolidated Laboratory Services (DCLS) is one of the first U.S. public health labs to use genetic technology to provide more clarity on COVID-19's transmission and spread. This information, gathered with the U.S. Centers for Disease Control and Prevention, international health partners, and universities, will provide the commonwealth with critical information to further prevent and respond to the global pandemic. The DCLS is also maintaining a library of positive samples and tests from both the public lab and private testing facilities.

WASHINGTON, D.C. — In response to D.C. Public Schools (DCPS) closing due to COVID-19, Mayor Muriel Bowser created the DC Education Equity Fund, made possible through partnerships with Education Forward DC, the DC Public Education Fund, the Greater Washington Community Foundation, and contributions from donors. The purpose of the Fund is to provide students, teachers, and parents with adequate resources for remote learning. DCPS is also providing devices to families through the Empowered Learners Initiative, a program dedicated to bridging the gap between learning and technology.

WEST VIRGINIA — Executive Order No. 14-20, issued on March 30 by Gov. Jim Justice, requires individuals traveling from areas highly infected with COVID-19 to self-quarantine for either 14 days or the length of their stay in West Virginia, whichever ends first. The order does not apply to people traveling for commercial trucking or essential business purposes such as health care, emergency needs, and military service. Those who do not abide by the order can be subject to a fine ranging from $50 to $500 or a jail term of up to one year.

The Coronavirus and the Economy

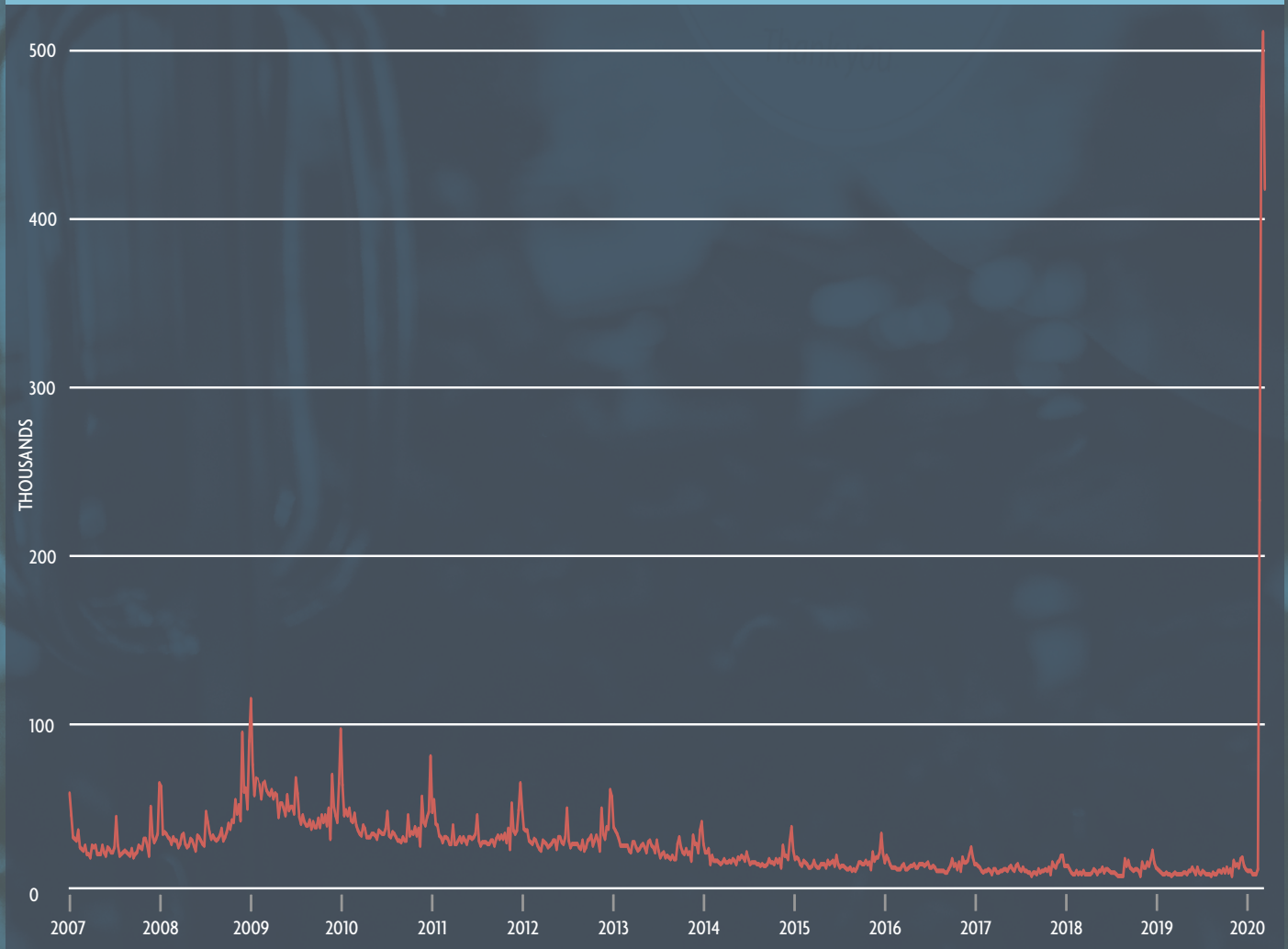
CHARTS BY JACOB CROUSE, DAVID A. PRICE, RACHEL RODGERS, JESSIE ROMERO, AND LUNA SHEN

The spread of SARS-CoV-2, the virus behind the illness COVID-19, brought tragedy to households across the United States in the late winter and spring of 2020. Tens of thousands of people in America have died and many more have suffered serious illness.

For individuals who were spared these direct effects, the virus led to havoc in daily life and in the economy. Millions endured job losses. This gallery offers a record of some of the unprecedented economic changes that Americans experienced.

UNEMPLOYMENT INSURANCE CLAIMS IN THE FIFTH DISTRICT

Initial claims, in thousands



NOTE: Not seasonally adjusted. Date range is Jan. 6, 2007, to April 11, 2020.

SOURCE: U.S. Department of Labor via Haver

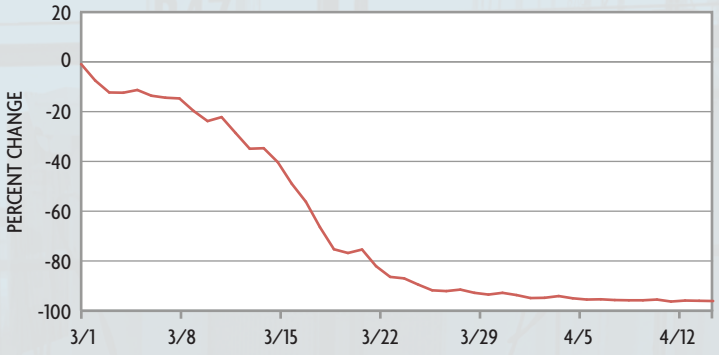
Share this article: https://bit.ly/covid-charts

GOING AWAY AND GOING OUT

The effect of the crisis on travel and dining was massive

Airline Passengers, 2020 vs. 2019

Percent change in passengers at TSA airport checkpoints compared with one year previous

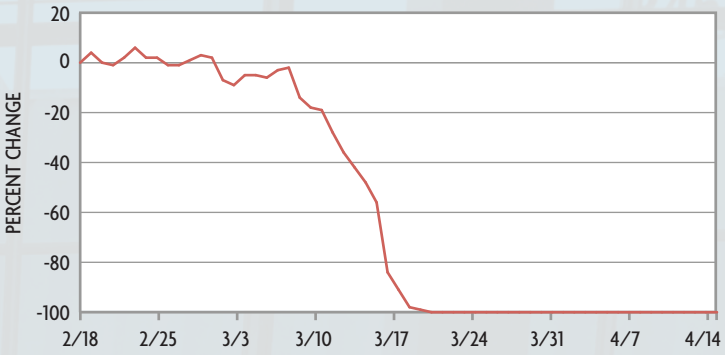


NOTE: Date range is March 1 to April 15.

SOURCE: Transportation Security Administration

Restaurant Diners, 2020 vs. 2019

Percent change in seated diners compared to one year previous



NOTE: Counts include online reservations, phone reservations, and walk-ins at restaurants in the OpenTable network. Date range is Feb. 18 to April 16.

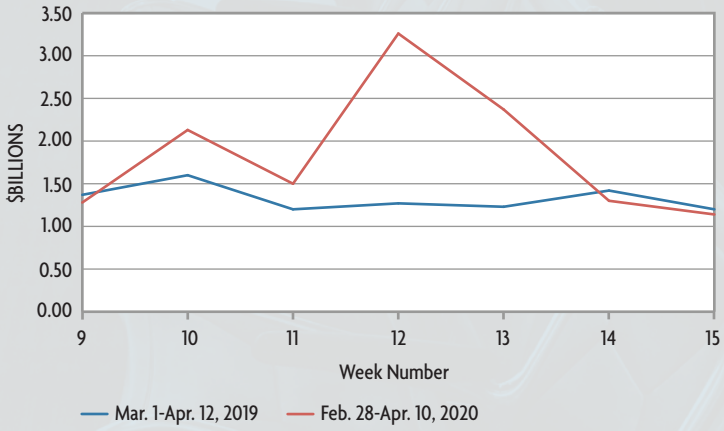
SOURCE: OpenTable

PAYMENTS

Demand for cash increased while use of credit cards went down modestly

Cash Demand, 2020 vs. 2019

Richmond Fed cash and coin volume

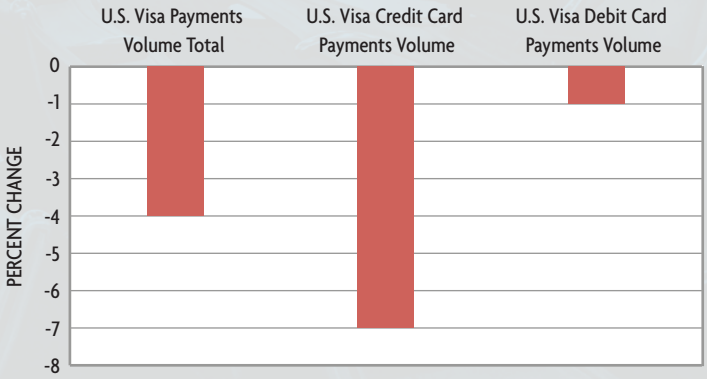


NOTE: Data include cash and coin paid out to depository institutions by the Baltimore, Charlotte, and Richmond offices of the Richmond Fed. In 2019, weeks nine through 15 are the weeks ending Mar. 1-April 12. In 2020, weeks nine through 15 are the weeks ending Feb. 28-April 10.

SOURCE: Federal Reserve Bank of Richmond

Credit Card and Debit Card Trends

Visa Card Usage in March



NOTE: Date range is March 1 to March 28.

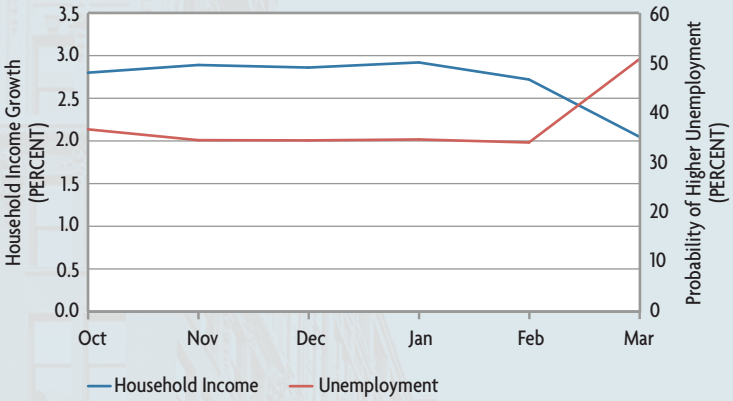
SOURCE: Visa Inc. Form 8-K, March 30, 2020

CONFIDENCE IN THE ECONOMY

The crisis shook measures of business, consumer, and investor sentiment

Household Income and Unemployment Growth Expectations, One Year Ahead

New York Fed Survey of Consumer Expectations

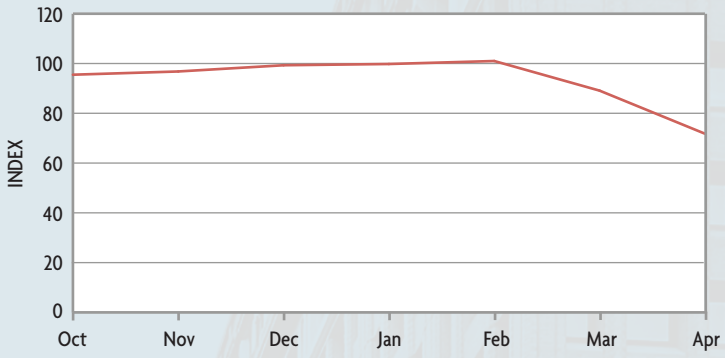


NOTE: Household income predictions are medians; unemployment probabilities are means.

SOURCE: Federal Reserve Bank of New York

Consumer Confidence

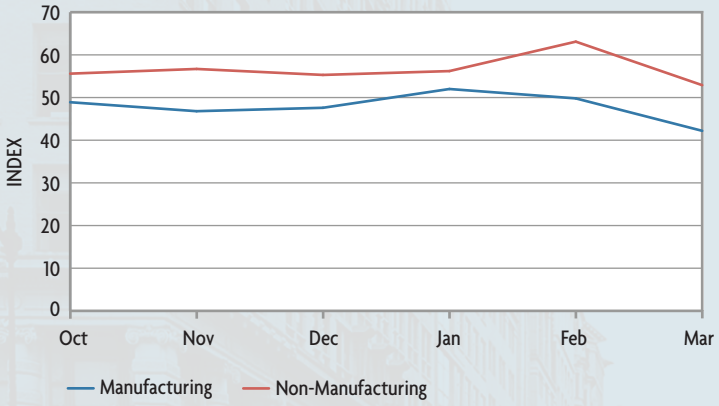
University of Michigan Index of Consumer Sentiment



SOURCE: University of Michigan Surveys of Consumers

New Orders

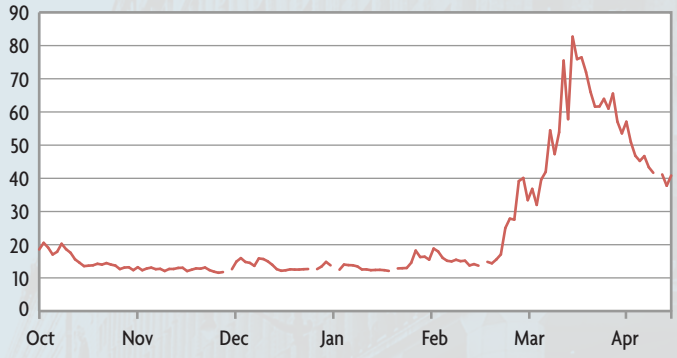
ISM manufacturing and non-manufacturing new orders indexes



SOURCE: Institute for Supply Management

Expectations of Stock Market Volatility

CBOE Volatility Index (VIX)

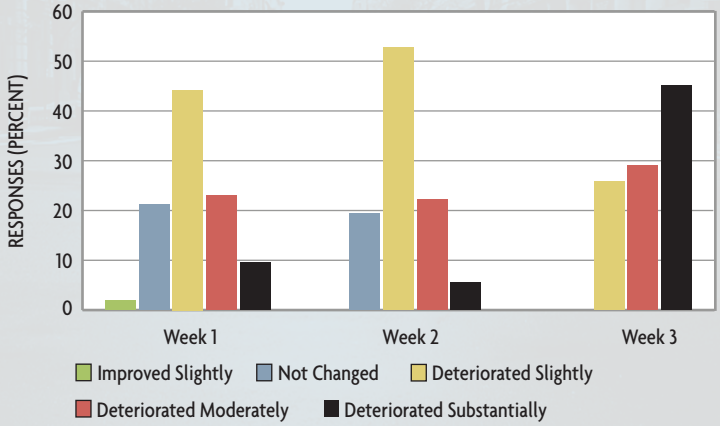


NOTE: Date range is Oct. 1, 2019, to April 15, 2020. Missing values represent dates of CBOE holidays.

SOURCE: Chicago Board Options Exchange via FRED

Fifth District Managers' Changing Outlook in March

"How has the spread of the coronavirus affected your outlook for the U.S. economy?"



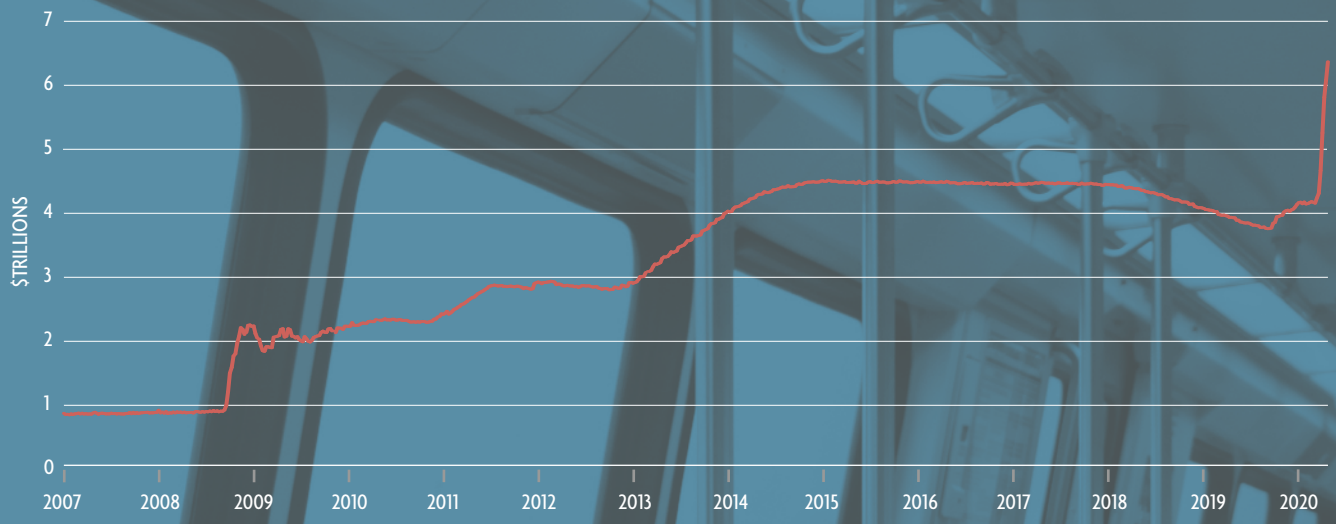
NOTE: Special question included in March 2020 Regional Surveys of Business Activity. Week 1 is Feb. 27 to March 4. Week 2 is March 5-11. Week 3 is March 12-18.

SOURCE: Federal Reserve Bank of Richmond

HOW THE FED RESPONDED

Federal Reserve System Assets

In trillions of dollars



NOTE: Total assets (less eliminations from consolidation). Weekly. Date range is Jan. 3, 2007, to April 15, 2020.

SOURCE: Board of Governors of the Federal Reserve System via FRED

SELECTED ACTIONS OF THE FED IN RESPONSE TO THE 2020 CORONAVIRUS CRISIS

- **March 3.** Federal Open Market Committee (FOMC) lowers the target range for the federal funds rate by 1/2 percentage point, to 1 percent to 1.25 percent, noting that "the coronavirus poses evolving risks to economic activity."
- **March 15.** FOMC announces it is lowering the target range for the federal funds rate by 1 percentage point, to 0 percent to 0.25 percent. To encourage borrowing from the discount window, Fed lowers the primary credit interest rate by 1.5 percentage points, to 0.25 percent.
- **March 17.** To support the market for commercial paper (short-term corporate debt) and to support primary dealers that buy and sell Treasury securities, Fed revives the Commercial Paper Funding Facility and the Primary Dealer Credit Facility, which were originally created in 2008 during the financial crisis. These programs are based on the Fed's emergency powers under section 13(3) of the Federal Reserve Act.
- **March 18.** Fed uses its emergency powers to create the Money Market Mutual Fund Liquidity Facility to support the markets for commercial paper and other assets that money market funds hold in order to maintain confidence in money market funds.
- **March 19.** Fed expands its existing arrangements, known as central bank swap lines, that provide lending to foreign central banks to assist them in delivering U.S. dollar funding to financial institutions in their markets. In addition to the five current participants — the Bank of Canada, the Bank of England, the Bank of Japan, the European Central Bank, and the Swiss National Bank — nine more foreign central banks are added.
- **March 23.** Fed uses its emergency powers to create the Primary Market Corporate Credit Facility to buy debt securities from corporations and the Secondary Market Corporate Credit Facility to buy those securities on the open market. To further support the availability of credit, Fed also revives the Term Asset-Backed Securities Loan Facility, or TALF, a broader version of the emergency program originally created during the 2007-2008 financial crisis.
- **March 31.** Fed announces the Foreign and International Monetary Authorities Repo Facility to enable foreign central banks not participating in the central bank swap lines, as well as international monetary authorities such as the International Monetary Fund, to borrow dollars using Treasury securities as collateral.
- **April 6.** Fed announces a new emergency lending facility, the Paycheck Protection Program Liquidity Facility, to support the Small Business Administration's (SBA) Paycheck Protection Program. The SBA program guarantees loans to small businesses so that those businesses can keep workers employed.
- **April 7.** Fed and other bank regulatory agencies issue a revised interagency statement encouraging financial institutions to work with borrowers and offer "prudent loan modification programs" to customers affected by COVID-19.
- **April 9.** Fed uses its emergency powers to create the Main Street Lending Program for the purchase of up to $600 billion in loans, funded in part by $75 billion from the Treasury Department, and the Municipal Liquidity Facility to lend up to $500 billion to states and municipalities.
- **April 14.** Fed and other bank regulatory agencies announce temporary changes to appraisal requirements for residential and commercial real estate lending.
- **April 16.** Fed announces that its Paycheck Protection Program Liquidity Facility is fully operational.

— David A. Price

Keeping in Touch about COVID-19

BY TIM SABLIK

Economic and health conditions have been changing rapidly in the wake of the COVID-19 outbreak and shelter-in-place orders intended to limit its spread. The regional Federal Reserve Banks have been working hard to understand the economic effects of the virus in their districts.

For researchers at the Richmond Fed, this has involved gathering data to obtain a clearer picture of current conditions in the Fifth District as well as looking ahead to model how shocks from COVID-19 might reshape the economy in the near future.

Every month, regional economists at the Richmond Fed survey businesses about economic conditions and post the aggregated findings online. On Feb. 27, the regional team added three new questions to the regular survey to measure how COVID-19 had affected individual businesses and their outlook for the U.S. economy as a whole. As the virus spread throughout the United States, survey respondents' expectations for the future turned sharply negative. (See chart on p. 5.)

"The topical questions, like the ones we added on the effects of the virus, invite firms to share their individual stories, which allow us to see both the collective and the unique challenges companies are facing in our region," says Joseph Mengedoth, a Richmond Fed regional economist.

In addition to using surveys, the Richmond Fed also gains perspective from companies by talking with business leaders. This provides a more detailed understanding of how businesses' operations are being affected by COVID-19 and what the economic recovery might look like when the crisis is over.

"We've really been ramping up our outreach," says Renee Haltom, one of the Bank's three regional executives who engage with business, banking, and community leaders. "Our usual in-person meetings may not be possible now, but that's actually opened the door to reach more people since we're only commuting to the next Zoom screen or conference call. Many of our business contacts are also now reaching out to us to volunteer information and introduce us to others in their network."

Richmond Fed researchers have also been gathering data on how communities are being affected by COVID-19. This includes reaching out to low- and moderate-income communities to assess their access to food, shelter, and health care.

"Our areas of focus and outreach have shifted from longer-term initiatives to identifying and understanding the impact COVID-19 is having on underserved communities in the Fifth District," says Christy Cleare, community affairs officer at the Richmond Fed. "We've reached out to community stakeholders and are sharing our learnings with the Fed's Board of Governors and other community leaders who are working on solutions."

Economists in the Richmond Fed's research department have been using incoming data to attempt to forecast the effects of COVID-19's spread on various parts of the economy. One focus area is how the economic disruption will affect the ability of households and businesses to repay loans on time — relevant to the stability of the financial system.

In an April working paper, Richmond Fed economists Grey Gordon and John Jones estimated how much loan delinquencies might increase under various unemployment and house price scenarios. They found that home mortgage and student loan forbearance would result in the greatest reduction in delinquencies. In another report, Richmond Fed economist Zhu Wang looked at how the disruption from the virus might affect auto loan default rates.

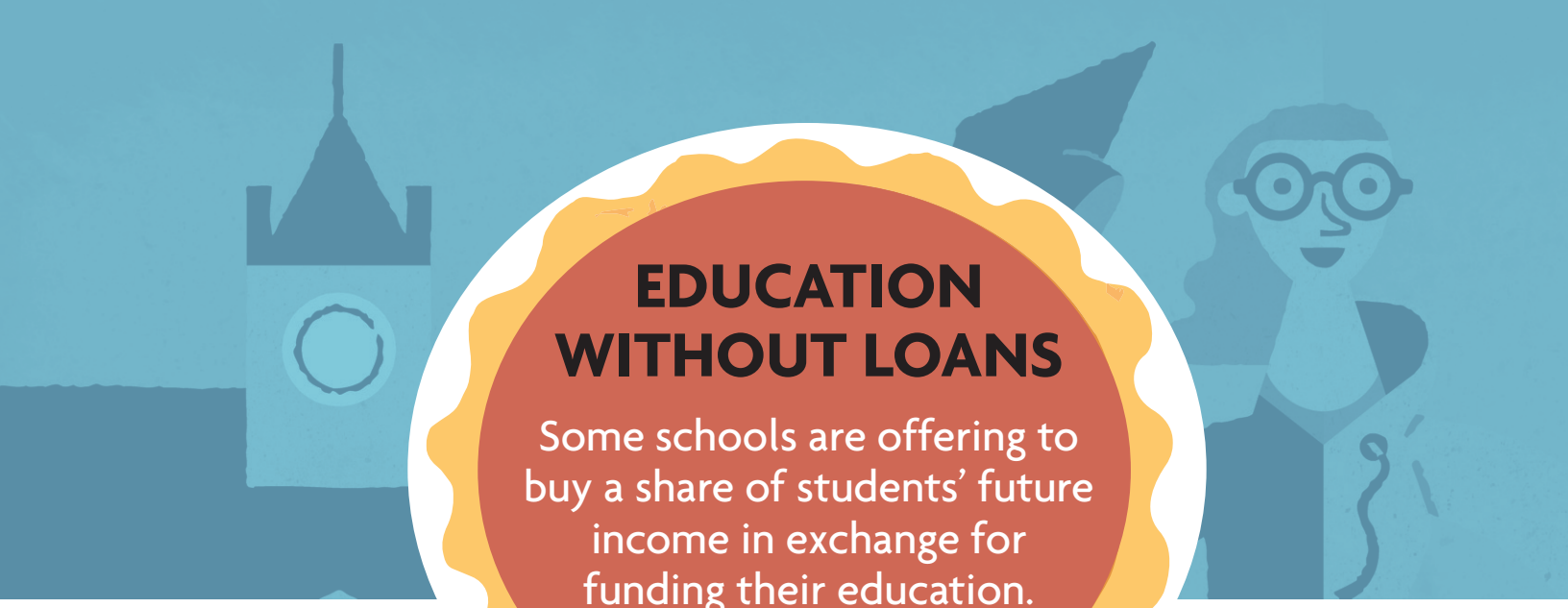
Richmond Fed economists have also been studying how financial markets responded to the initial disruption of the outbreak in March, how the economy might adjust as activity shifts from sectors of the economy that have shut down to others that have ramped up, and how financially distressed and vulnerable households are likely to be affected by the virus and economic disruptions. Hourly workers and businesses in the leisure and entertainment and food service industries have been particularly hurt by the effects of social distancing measures, for example.

This research helps inform Richmond Fed President Tom Barkin and other monetary policymakers in their deliberations in Federal Open Market Committee meetings.

"The well-established culture in our group of economists for working as a team has been particularly important to understanding the shock to the economy stemming from the COVID-19 outbreak," says Huberto Ennis, group vice president for macro and financial economics at the Richmond Fed. "It has allowed us to quickly move to combine our researchers' different expertise and knowledge backgrounds to obtain a more complete picture of the situation. That same approach will surely help us in the weeks to come as we start to assess the ways our economy can move forward from here." **EF**

Visit the Richmond Fed's website to stay up to date with the latest data and research on the COVID-19 outbreak.

Share this article: https://bit.ly/covid-econ



EDUCATION WITHOUT LOANS

Some schools are offering to buy a share of students' future income in exchange for funding their education.

By Tim Sablik

The cost of college has been rising. After adjusting for inflation, the average tuition for a private four-year school in 2019-2020 is about twice what it was three decades ago. For public four-year schools, tuition nearly tripled over the same period.

Scholarships and other need-based aid mitigate some of the costs of higher education, but the majority of young adults who attend college end up taking out loans. Over the last two decades, the total amount of outstanding student debt in the country has marched steadily upward, increasing nearly fivefold to more than $1 trillion after adjusting for inflation. (See chart.)

It is true that for many, college is a worthwhile investment even despite these costs. College graduates earn more on average and also tend to be less susceptible to disruptions in the economy. But taking on debt to go to college is risky. Most of the benefits of a higher education only accrue to students who graduate, but monthly loan payments come due whether a student finishes or not. This burden can weigh heaviest on those least equipped to pay: Research from the Richmond Fed has found that poorer students were about 27 percent more likely to drop out of college than wealthier students.

Many policymakers and economists worry that rising student debt could be forcing even those who graduate and find jobs to delay other big milestones like buying a home or getting married. (See "Are the Kids All Right?" *Econ Focus*, Third/Fourth Quarter 2016.) There are also signs that a growing number of student loan recipients are struggling to keep up with monthly payments. Consumer debt delinquencies have generally trended down since the Great Recession, with the exception of student loans, which now have a higher rate of severe delinquency than mortgages, auto loans, or credit cards. (See chart.)

In 2015, Mitchell Daniels, Purdue University president and former governor of Indiana, addressed Congress about this growing student debt crisis. "Student debt obligations are a modern form of indentured servitude," Daniels declared. "The personal implications of the debt can be harsh throughout a borrower's life. The demands of loan payments, especially private loans, are normally unsympathetic to periods of unemployment or underemployment, serious illness, or new life callings."

In his testimony, Daniels called on colleges and the federal government to explore alternative funding mechanisms for higher education that did not leave students saddled with debt. One idea he highlighted that has since seen growing implementation, including at Purdue, is the income share agreement, or ISA.

Buying a Share in Human Capital

ISAs provide students with funding to cover their education expenses in exchange for a portion of their income once they start working. Under a typical contract, recipients pledge to pay a fixed percentage of their incomes for a set period of time up to an agreed cap. For example, a student who has $10,000 of his or her tuition covered through an ISA might agree to repay 5 percent of his or her monthly income for the next 120 months (10 years), up to a maximum of $20,000. ISAs typically also have a minimum income threshold before payments kick in; if the recipient earns less than the minimum, he or she pays nothing. This means that ISAs offer students more downside protection than a traditional loan.

This downside protection is what attracted Andrew Hoyler to Purdue's "Back a Boiler" ISA program, which launched in the fall of 2016. Hoyler, who graduated from Purdue's professional flight program in 2017, signed up for Back a Boiler in his senior year. He received $21,263 in reduced tuition and flight fees in exchange for agreeing to repay 7.83 percent of his monthly income for 104 months, or until he had paid back 2.5 times the amount he originally received. Now a pilot for PSA Airlines, a subsidiary of American Airlines, he has been making payments on his ISA for about 30 months.

"Starting pilot pay is not very high, so I knew I would

ILLUSTRATION: TIMOTHY COOK

not have much discretionary income my first few years after graduation," Hoyler said in an email. "ISAs provide a safety net if I find myself out of work. If I reach the end of the payment term before I finish paying things off, the ISA is forgiven with no questions asked."

Hoyler is particularly grateful to have that safety net now, as the airline industry is being rocked by the COVID-19 outbreak. "The ISA is giving me a sense of relief. If I find myself furloughed, my payments stop with zero interest," he says.

Proponents of ISAs argue that in addition to protecting students from the downside risk of not earning enough to make monthly loan payments, ISAs also align incentives between students and schools in a way that traditional loans do not. When students take out loans for education, the school gets paid whether or not the students later succeed in the job market. But if a school enters into an ISA with its students, it only succeeds if its students succeed.

"That alignment of interests is one of the strong points in favor of income share agreements," says Mary-Claire Cartwright, vice president of information technology at the Purdue Research Foundation and program manager for Back a Boiler. "We want our students to feel like we are there to catch them if they don't get off to a perfect launch after graduation."

Purdue is not the only school that has recently started offering ISAs. Colorado Mountain College set up a program to provide funding for "DREAMers," immigrants who came to the United States illegally as children and therefore don't qualify for federal student loans. The University of Utah has an ISA program to help students finish their degrees when they might otherwise have to drop out for financial reasons.

ISAs have also gained traction at online skills training programs, including many coding academies such as General Assembly and Lambda School. Students receive an education in a technical subject, such as coding or user experience design, in exchange for signing on to an ISA. According to a 2019 survey by the website Course Report, 17 percent of boot camp graduates in 2019 used an ISA or some other form of deferred tuition.

Because most skills training programs like coding boot camps are built around the opportunity for students to get a well-paying job, they often tout the minimum income threshold protection of their ISAs. For example, Lambda School advertises that students "pay nothing" until they get a job paying at least $50,000 a year. This is in line with the average salary for a coding boot camp graduate, nearly $67,000, according to the Course Report survey. Lambda also promises to help students "hunt down jobs, nail interviews, and negotiate salary."

"Coding boot camps are the prototypical use case for ISAs," says Daniel Pianko, co-founder and managing director of University Ventures, an investment firm that funds companies looking to make higher education more accessible and affordable. ISAs help skills training programs signal to prospective students that they stand behind their product by "putting their money where their mouth is," says Pianko.

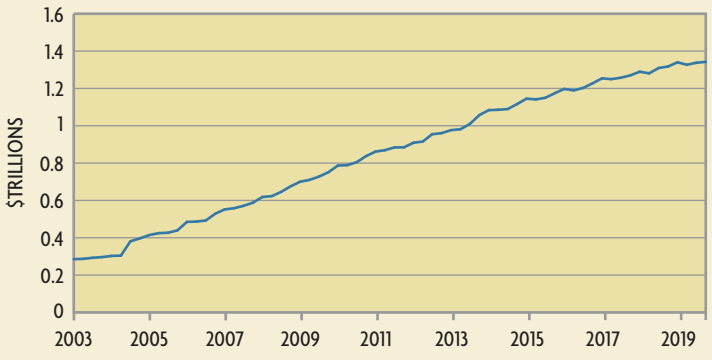
"If you're going to school for a nursing or coding credential, you're not doing it for fun; you want a job," echoes Tonio DeSorrento, co-founder and CEO of Vemo Education, one of the companies backed by University Ventures. Vemo partners with schools, including Purdue, and online skills training academies to design, implement, and administer ISAs. "If you are choosing between schools, which one are you going to pick? The one that says, 'Pay upfront and see what happens?' Or the one that says, 'Pay only if this works?'"

Learning from the Past

While ISAs might seem like a relatively new innovation, the idea has actually been around for decades. Famed economist Milton Friedman first wrote about them in 1955. He argued that loans are not the ideal way to fund investments in human capital because they require students to shoulder too much of the risk. Failure to launch leaves recipients of student loans making payments on an investment that didn't pan out. Moreover, it is difficult for students to offer

The Rise of Student Debt

U.S. student loan balances, adjusted for inflation

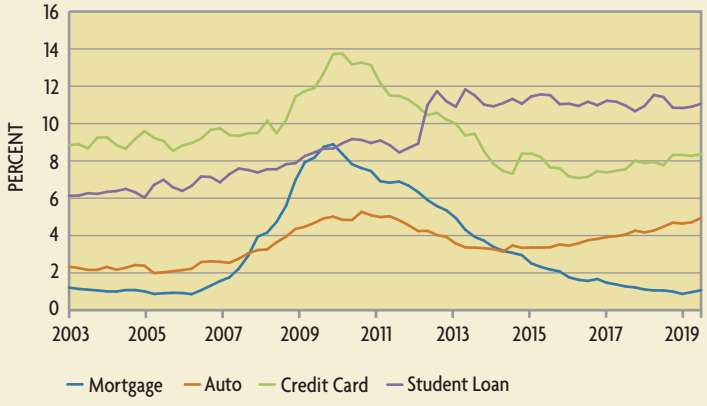


NOTE: Balances are in constant 2012 dollars. Inflation adjustment based on the PCE index.

SOURCE: New York Fed Consumer Credit Panel/Equifax; U.S. Bureau of Economic Analysis

Student Loan Delinquencies Remain High

Percentage of loan balances that are 90+ days delinquent



SOURCE: New York Fed Consumer Credit Panel/Equifax

lenders collateral for education loans, meaning such loans will be scarce and expensive absent subsidies.

Friedman argued that in the market, companies typically do not rely on debt to fund risky investments. Instead, they issue equity, asking investors to share some of the downside risk in exchange for a share of the profits if the investment works out.

"The counterpart for education would be to 'buy' a share in an individual's earning prospects: to advance him the funds needed to finance his training on condition that he agree to pay the lender a specified fraction of his future earnings," Friedman wrote.

While Friedman saw no legal hurdles to creating these types of contracts, he acknowledged that there were a number of reasons why they hadn't been widely adopted. Chief among them is the fact that ISAs are costlier to administer than debt. An ISA requires issuers to track borrowers' incomes, potentially over long time horizons and across different employers and geographic locations. Borrowers, in turn, have an incentive to hide their income to reduce payments, making administration that much trickier.

This may be why early attempts to implement Friedman's idea involved trying to graft some of the benefits of ISAs onto debt. In the 1970s, Yale University created the Tuition Postponement Option (TPO) with the help of Nobel Prize-winning economist James Tobin. The plan grouped student borrowers into cohorts who agreed to pay Yale a percentage of their future income until the entire cohort's debt plus interest was repaid. Borrowers could buy their way out of the program early by paying 150 percent of their total award plus interest.

While the program somewhat resembled Friedman's idea by tying payments to income, the fact that each individual was responsible for the collective debt of the group proved disastrous. Wealthier borrowers and those who had borrowed small amounts bought their way out of the program early. Those who remained in each cohort either failed to make payments or were left paying shares of their income for decades on a negatively amortizing principal. Yale stopped accepting new applicants for the program in the late 1970s and ultimately canceled remaining debts in the early 2000s.

"I think what people learned from the Yale program was that making someone's payments contingent on what others pay is a bad idea," says Miguel Palacios, a professor of finance at the University of Calgary. He has written extensively about ISAs and co-founded Lumni, a venture that finances ISAs across the Americas.

Successors to Yale's program made payments tied to the individual but still tended to be based on debt. President Bill Clinton, a participant in Yale's TPO, proposed the first income-based repayment plan in the United States for federal student loans. Today, recipients of federal student loans can qualify to make their monthly payments proportionate to income. On the surface, this allows federal loans to offer many of the same benefits

Andrew Hoyler graduated from Purdue's professional flight program with the help of the university's ISA offering. "With the aviation industry currently in flux, the ISA is giving me a sense of relief. If I find myself furloughed, my payments stop with zero interest."

IMAGE: ANDREW HOYLER

of ISAs to students. But like the Yale experiment, these plans are still susceptible to ballooning interest payments.

"If you experience hardship and have to make smaller payments on a loan, it can negatively amortize — it can get bigger," says DeSorrento. Moreover, while income-driven repayment plans for federal loans allow borrowers who make regular payments to have their remaining balance forgiven after 20 or 25 years, the amount forgiven can be taxable as income. This would leave some borrowers who are unable to pay their loans with a hefty tax bill.

"ISAs don't work that way," says Pianko. "They're not debt, so at the end of the payment period, any remaining obligation just expires."

Balancing Costs and Benefits

Given the many benefits ISAs offer students over debt and the fact that schools can use them to signal the quality of their programs, why has the idea been so slow to catch on since Friedman's proposal? As he recognized at the time, it has to do with balancing costs to ensure that schools and other investors have enough incentive to offer ISAs.

"A fundamental difference between what Friedman wrote and how ISAs have actually been implemented is that Friedman was thinking about something that had no upper cap on repayments," says Palacios. "So if Bill Gates had taken out an ISA while in school, the issuer would have made billions of dollars."

That kind of upside would be one way to incentivize schools or private investors to offer ISAs, but most ISAs today do have a cap on total payments. While caps offer students additional protection, they limit how much investors can recoup from successful students to offset losses from students who end up paying back less. For some institutions, this might not be too big a concern.

"We work with schools that intentionally offer ISAs to students who are high risk and might not succeed because they want to try to help them," says DeSorrento. "The vast majority of Vemo's ISA programs are subsidized by the schools."

These subsidies might be partially offset by the increased prestige and enrollment ISAs generate for a school, something that Vemo estimates for its school

partners. Schools might also regard some degree of losses on ISAs as consistent with their missions, treating the ISAs as analogous to financial aid that recipients may or may not pay back. Purdue's ISA, for example, is funded by money from donors. Any ISA payments they receive go to fund additional ISAs or other affordability programs. Private training academies, as for-profit institutions, are less likely to be able to rely on donors to fund their ISAs.

The decision of how to fund contracts in the short term could affect how well the ISAs align the interests of school and students. For example, online coding academy Lambda School works with Edly, an online marketplace for the sale of ISA contracts to investors. This provides Lambda with some operating capital upfront while it awaits student payments. While Lambda has indicated that it still finances some of its operations itself, retaining "skin in the game," some critics have argued that selling ISAs to private investors weakens the alignment of incentives between Lambda and its students.

"The institution still has an incentive to serve its students well because if the investors who put money in the program don't see returns, then those investors will not continue financing the ISAs," says Palacios. Indeed, Lambda says that the advances it receives from investors adjust based on how well its graduates do in the job market. "But that link is weaker than if the institution's money was directly on the line," Palacios adds.

"Schools should have significant skin in the game," agrees Pianko. "It makes sense for schools to work with investors to get some capital up front to provide services to students. But the key is structuring the ISAs so that the school retains the first-loss piece. In the case of University Ventures, we require any schools we finance to keep a large portion of the risk. If the students don't have the economic success they hoped for, then the school doesn't get paid as much."

It remains to be seen whether the institutions now offering ISAs can balance the costs in a way that sustains their program over the long term while maintaining the benefits of risk-sharing and downside protection for students. Although ISAs are now offered at a growing number of colleges and vocational training programs, these programs are only a few years old at this point.

The Future of Education Finance?

While proponents of ISAs would like to see them become more widespread in educational finance, there are a few factors that may keep them a niche option, at least for now.

Student loans have a well-established regulatory and legal framework, but lawmakers are still deciding how best to allow innovation in ISAs while protecting students from predatory agreements. In July 2019, Sen. Todd Young (R-Ind.) introduced a bipartisan bill to legally define ISAs and establish requirements for a "qualified ISA," including caps on the share of income lenders can charge and the duration of contracts. The bill has yet to progress any further. As long as the regulatory environment remains murky, investors and schools may be hesitant about ISAs.

On the other hand, Vemo has seen significant growth since it entered the market in 2016 with Purdue. Today, the company reports that it works with more than 75 schools and training programs to offer ISAs. DeSorrento believes that if those schools succeed with ISAs and start to attract students because of those programs, it will put competitive pressure on more schools to offer ISAs as well. That said, students and educators acknowledge that ISAs aren't right for everyone.

"If you are going into a six-figure job right after school, a traditional loan would likely be better," says Hoyler.

Purdue presents students with comparisons showing how much they could expect to pay under an ISA versus a loan, allowing them to decide which financial instrument is right for them. According to Cartwright, the school has funded more than 1,200 ISA contracts so far.

"Our program is not a substitute for federal student loans," says Cartwright. "We are targeting students who have exhausted their grants, scholarships, and federal student loans and who might otherwise need a parent to take on a Parent PLUS loan or go to the private loan market."

Indeed, most proponents of ISAs see it as unlikely, at least for now, that the agreements become the dominant vehicle for financing education. For one thing, federal student loans, unlike privately offered ISAs, are federally subsidized. But for students who don't qualify for such loans or have exhausted them, ISAs may be an attractive alternative. Others, like Palacios, also welcome the fact that Friedman's original idea has influenced the federal loan system through the introduction of income-based repayment.

"The other component from ISAs that I think government loans should incorporate is the idea that someone should have skin in the game when it comes to how students perform after leaving school," says Palacios.

Wherever ISAs go from here, they have already sparked bipartisan interest in looking at ways to offer better financial protections for students and incentives for educators as well as expanding access to higher education and skills training, which are increasingly in demand today. **EF**

Readings

Bair, Sheila, and Preston Cooper. "The Future of Income-Share Agreements." Manhattan Institute Report, March 2019.

Friedman, Milton. "The Role of Government in Education." In Robert A. Solo (ed.), *Economics and the Public Interest*. New Brunswick, N.J.: Rutgers University Press, 1955.

Palacios, Miguel. "Financing Human Capital through Income-Contingent Agreements." In Stuart Andreason, Todd Greene, Heath Prince, and Carl E. Van Horn (eds.), *Investing in America's Workforce: Improving Outcomes for Workers and Employers*. Kalamazoo, Mich.: W.E. Upjohn Institute for Employment Research, 2018.

Doing Well by Doing Good

BY MADELEINE HO

It seems safe to say that corporate philanthropy, in general, is beneficial to society. It appears to be a "win-win" situation where corporations engage in prosocial behavior and in return receive good publicity that may increase longer-term profits. But if some corporate giving is in part a means of gaining political influence with elected officials, then taxpayers are, in effect, subsidizing these tax-deductible contributions — and voters and investors are losing the transparency afforded by regulations on political contributions.

A forthcoming article in the *American Economic Review* by Marianne Bertrand of the University of Chicago, Matilde Bombardini and Francesco Trebbi of the University of British Columbia, and Raymond Fisman of Boston University suggests that some corporate philanthropy is politically motivated and attempts to quantify the amount.

Bertrand, Marianne, Matilde Bombardini, Raymond Fisman, and Francesco Trebbi. "Tax-Exempt Lobbying: Corporate Philanthropy as a Tool for Political Influence." *American Economic Review*, forthcoming.

The authors approach their research question with three different strategies. They first use data on Fortune 500 and S&P 500 companies' charitable contributions and PAC contributions to establish that for a given corporation and congressional district, there is a positive relationship between the firm's charitable contributions and political action committee (PAC) spending. They show that the movement of charitable contributions over time looks very similar to that of contributions to PACs, a more traditional channel of political influence.

The authors' second strategy is to use that data to show that a firm's charitable contributions are more likely to go to the congressional districts of representatives who serve on committees that are of interest to the firm. First, they use lobbying reports to assemble a variable that records the number of issues covered by the congressional committees on which a representative serves that are of interest to a corporate foundation during a certain congressional session. They then use regression analysis to test their theory. If their hypothesis is correct, then a higher number of issues of interest covered by a representative from a certain district should be associated with a larger contribution to that district's charities from the company's foundation.

Yet establishing a positive relationship between issues of interest and charitable contributions is not sufficient to prove that issues of interest cause charitable contributions to increase. It could be that corporations donate for nonpolitical reasons in locales whose representatives, due to the issues important to their constituency, self-select into committees of interest. Establishing causation by eliminating alternative explanations is what economists call "causal identification." That is why the authors use "fixed effects" regressions, a type of regression that takes into account such hidden factors. By using this method, the authors are able to capture the increases and decreases in charitable contributions associated with a representative joining or leaving a committee of interest. They argue that since it is unlikely that any other alternative would explain why the amount of contributions change over time, the effect they capture is likely to be causal. Using a few different versions of this empirical model, they find that a 1 percent increase in issues of interest covered by a district's representative leads to a 0.04 to 0.091 percent increase in charitable contributions to that district.

The third strategy they use is to link data on representatives' personal connections to nonprofits with data on charities to which firms' foundations donate. (Representatives' personal connections to nonprofits must be disclosed under the Ethics in Government Act of 1978.) They use these data to explore whether firms are more likely to donate to a nonprofit with a connection to Congress if it aligns with their lobbying interests. To do this, they create measures of a nonprofit's political relevance to a firm, including a variable that indicates whether a nonprofit is connected to a politician who serves on a congressional committee of interest to a firm's lobbying efforts. In general, they find that, among nonprofits with a connection to a representative, an increase in a nonprofit's political relevance to a firm increases the likelihood that that nonprofit receives a charitable grant from the firm.

The authors build an economic model to quantify the fraction of corporate philanthropy that is politically motivated. In the model, a congressional committee assignment that is relevant to a firm increases the productivity of investment in politically motivated charitable giving and in PAC contributions. They estimate the share of corporate giving that is politically motivated to be 6.3 percent at its most conservative, which amounts to $1.13 billion of the $18 billion that U.S. firms gave in 2014, the last year of the sample.

This research sheds light on the not-insignificant role that corporate philanthropy plays in the political arena and suggests that corporate giving may not always be entirely a "win-win" situation. **EF**

The More We Get Together

BY JOHN MULLIN

The COVID-19 pandemic has disrupted work patterns across many occupations, and the economics profession has been no exception. In particular, many in-person gatherings of economists have been reconfigured as online meetings or canceled altogether. At first glance, this may not seem like too large an inconvenience in the age of webinars and Zoom meetings. But it appears that economists still see a great deal of value in physically gathering to exchange ideas.

Before the crisis, economists regularly got together at large conferences, such as the annual meeting of the American Economic Association (AEA), which drew more than 10,000 attendees in January. AEA meetings offer hundreds of panels covering the latest research across many disciplines. Economists also gathered frequently at smaller-scale workshops and seminars. Workshops often involve a small number of economists presenting research on a single topic, while seminars often focus on the latest research paper of a single economist.

One of the main motivations for attending conferences, workshops, and seminars is the opportunity to present research. "You get to share your work, and you get feedback about things in your paper. As a result of attending the conference, you end up with a better paper," says Richmond Fed economist Pierre-Daniel Sarte.

In the academic world of "publish or perish," there is some evidence that presenting at premier conferences may confer an advantage. In a 2019 National Bureau of Economic Research working paper, Yuriy Gorodnichenko of the University of California, Berkeley, Tho Pham of the University of Reading, and Oleksandr Talavera of the University of Birmingham found a "significantly positive association between conference presentation (especially at AEA conferences) and the probability of being published in a high-quality journal."

Conferences also offer the opportunity to network and to meet potential research collaborators. "I have met some of my co-authors at conferences," says Sarte. "Sometimes you come as a discussant, and you begin a dialogue with the person whose paper you are discussing. You talk about areas of agreement and areas where you think differently. You may meet later between sessions or at dinner and have a more in-depth discussion about each other's work and how it can be advanced."

But some economists have observed that their fondness for the big conferences has diminished over time. "I don't get a huge amount of value out of the big conferences. The more focused ones are a lot more valuable," says Richmond Fed economist John Jones. "At a lot of the big ones, like the Econometrics Society, you may only have 15 to 20 minutes to present. The more focused, really topical ones, will give you 45 to 60 minutes."

The shorter time that is sometimes allotted to presenters at the big conferences may call for a different mindset. "What are your expectations when you have 20 minutes on a panel where you are presenting with four other papers?" says Richmond Fed economist Santiago Pinto. "You can mostly cover questions like: What is your topic? How did you do it? You cannot get into the details. So it is mostly about signaling. You are trying to encourage people to go home and read it."

Economists often use a series of small seminars to get feedback so that they can improve a working paper prior to submitting it to a journal for publication. "I have seen people give the same paper at different seminars and how they have incorporated comments into their paper," says Pinto. "And I have seen cases where that has made the paper better and has helped their chances of getting published."

The COVID-19 pandemic has affected economic gatherings in a variety of ways. Some of this year's big conferences scheduled for the spring or early summer have been canceled or rescheduled, including the annual meeting of the Midwest Economics Association, the annual conference of the Royal Economic Society, and the annual meeting of the Society of Economic Dynamics.

In career terms, these missed opportunities come as bad news to the participants, based on recent research by Fernanda Leite Lopez de Leon of the University of Kent and Ben McQuillin of the University of East Anglia. Analyzing the effects of the cancellation of a large academic conference in 2012 due to Hurricane Isaac, they found that the lost chance to present a paper decreased the likelihood of the paper being subsequently cited in the academic literature — a key measure of professional success.

Some smaller conferences have been held remotely but perhaps with mixed results. "I've been on a couple of Zoom conferences," says Sarte. "You get to give or hear a presentation. But you miss the discussions during break or when you go to coffee or dinner with someone. All this informal interaction is missing from Zoom."

This sentiment is shared by others. "A lot of what is of value is in the unstructured part of a conference or seminar," says Jones. "Maybe things will change with time if we are forced to meet in a remote fashion, but I am skeptical." **EF**

Share this article: https://bit.ly/econ-conf

The Repo Market is Changing (and What Is a Repo, Anyway?)

The market for repurchase agreements has repeatedly adapted to changing circumstances

BY JOHN MULLIN

On March 17, amid the market turbulence caused by the coronavirus pandemic, the Fed reintroduced its Primary Dealer Credit Facility, or PDCF. The Fed had first created the facility during the 2007-2008 financial crisis to alleviate severe strains in the "repo" market. While mostly invisible to the public at large, the repo market plays an important role in the transmission of monetary policy. It is also a critical source of financing for nonbank financial firms, including securities brokerage houses and real estate investment trusts that specialize in mortgages. (See table.) At the end of 2019, financial firms relied on the repo markets for over $4 trillion in borrowed funds to support their activities. The renewed PDCF is designed to make loans to primary dealers of U.S. Treasury securities, who are positioned to channel liquidity to repo markets in what policymakers expect to be a difficult economic environment.

The repo market had shown signs of strain even before the onset of the pandemic — but these difficulties appear to have been rather technical in nature and unrelated to fears of imminent recession. On Sept. 17, 2019, repo market interest rates spiked dramatically higher. This precipitated a great deal of concern and discussion among market participants and policymakers. Initial explanations for the rate spike focused on U.S. Treasury financing operations in the aftermath of a period in which the Fed had substantially contracted the reserves of the banking system. But the discussion soon gravitated toward the roles played by some of the major policy changes that had been implemented in response to the financial crisis. These included changes in the Fed's monetary policy operating framework and changes in bank regulatory and supervisory policies, especially in the area of bank liquidity management.

Taking a long-term perspective, it is hardly surprising that the functioning of repo markets changed in response to the financial crisis. Throughout the post-World War II period, repo markets have repeatedly adapted to changing circumstances.

A Market Evolves

At a very basic level, a repurchase agreement is a loan secured by collateral. Collateralized loans are nothing new, of course. They go back at least as far as ancient Greece and take a variety of different forms — two everyday examples include real estate loans secured by property and loans on cars subject to repossession. The contractual conventions and market structures associated with collateralized loans vary depending on the type of collateral, and they evolve over time in response to changing market conditions. This is particularly true for the repo market — where today's market arrangements are different in many important respects from those that existed in the immediate aftermath of World War II.

The U.S. repo market greatly increased in size and importance as inflation accelerated in the late 1970s and early 1980s. This rapid growth was spurred by a process that is referred to by economists as "disintermediation." As short-term interest rates increased during the period in response to increased inflation, banks could not respond by increasing the deposit rates they offered to their customers because checking deposit rates were capped by the Fed's longstanding Regulation Q. A growing disconnect between capped bank rates and increasing market rates created an incentive for institutions and individuals to bypass banks. Through this process of disintermediation, many institutions began to channel money directly to the repo market, while other institutions and individuals invested in money market mutual funds, which in turn channeled money to the repo market.

As the repo market grew in the early 1980s, a series of bankruptcies highlighted a number of legal and structural problems that needed to be sorted out. Prior to this period, there had been a great deal of ambiguity about the legal status of repo transactions. Most notably, there was a widespread presumption that repos were unlike other collateralized loans in one crucial respect: They were thought by many to be exempt from the bankruptcy code's automatic stay provision. This was a technical assumption that made a big difference because an exemption from the automatic stay provision would imply that repo collateral would not become tied up in bankruptcy proceedings of indeterminate length and that repo lenders would be able to sell the collateral immediately in the event of a default.

Yet prior to the 1980s, this assumption had never been put to a definitive test. It took a default episode and an act of Congress to resolve the ambiguity. When a small broker-dealer named Lombard-Wall filed for bankruptcy in August 1982, the court overseeing the case declared that the firm's repo liabilities would be treated as collateralized loans and therefore would not be exempt from automatic stay provisions. The court issued a temporary restraining

Nonbank Financial Firms are Big Repo Borrowers

Top categories of net borrowers and lenders (in billions of dollars)

	Gross Borrowing	Gross Lending	Net Borrowing (Net Lending)
Net Borrowers:			
Mortgage Real Estate Investment Trusts (M-REITs)	$379	-	$380
Securities Broker-Dealers	$1,755	$1,396	$359
Foreign Banking Offices in the U.S.	$531	$372	$159
Net Lenders:			
Money Market Mutual Funds	-	$1,175	($1,175)
U.S.-Chartered Banks	$128	$334	($206)
State and Local Governments	-	$141	($141)

NOTE: Figures are as of December 2019. **SOURCE:** Federal Reserve Board Flow of Funds Statistics via FRB website

order prohibiting the firm's repo creditors from selling the collateral backing the firm's repos. This caused a great deal of anxiety among private market participants and regulators alike, who were concerned that the court's rulings might discourage repo lending and substantially damage the availability of credit on the repo market, particularly during periods of heightened financial market uncertainty. In 1984, following a vigorous lobbying campaign by Wall Street firms that was joined by Fed Chair Paul Volcker, Congress enacted legislation that exempted repos on Treasuries (and other select securities) from the automatic stay provision of the bankruptcy code.

A further series of defaults in the 1980s encouraged another major structural change in repo markets — the ascendance of the tri-party repo market. It turned out that, for repo lenders, it was one thing to have the legal right to sell collateral in the event of a default, but it was quite another to have access to the collateral in order to be able to sell it. For example, after Lion Capital Group filed for bankruptcy in 1984, repo creditors ended up recovering only about three-quarters of the value of their loans because the collateral available to back the loans ultimately proved to be insufficient. What was needed was a mechanism to ensure that the collateral backing repo loans would be fully available to creditors in the event of default.

The tri-party repo market — which had been pioneered by Salomon Brothers in the late 1970s — provided just such a mechanism. In the tri-party market, repo collateral is earmarked and held in custody by an agent bank. Repo lenders are protected because they can access and sell collateral in the event of a borrower's default; repo borrowers are protected because they can secure access to the collateral that they have pledged once they repay their loan. The tri-party repo market grew rapidly from the 1980s onward and ultimately accounted for the majority of repo market activity for large government securities dealers.

The Financial Crisis

Repo markets played a prominent role in the 2004-2007 real estate boom and the ensuing financial crisis. In just four years, between December 2003 and December 2007, the asset-to-equity ratio of U.S. broker-dealers ballooned from 24:1 to 35:1. And this balance sheet expansion relied heavily on repo borrowing.

Lehman Brothers, in particular, relied heavily on the tri-party repo market to finance its securities inventory, which ended up being dangerously concentrated with illiquid mortgage-backed securities. By mid-2007, market participants had become concerned about Lehman's leverage as well as the quality of its asset holdings, and the firm's management embarked on a campaign to reduce the firm's leverage. But Lehman found itself with a dilemma. It was loath to raise equity capital, because firm management thought that would send a bad signal to the markets. But it found that reducing leverage through asset sales was just as problematic, because it could not sell assets without booking losses — and the recognition of those losses would seriously undermine the collateral value of the firm's remaining assets, which it relied on for repo market financing.

Although Lehman continued to present itself as solvent in its quarterly financial reports, market observers became increasingly skeptical. In addition to questionable asset valuation methods, it was later discovered that the firm had misrepresented its leverage by improperly pushing certain repo liabilities off its balance sheet at the end 2007 and in early 2008. After Bear Stearns was shuttered in March 2008, market participants became even more concerned about a run on Lehman Brothers. The firm finally declared bankruptcy in September 2008 — an event that seriously strained financial markets.

The runs on Bear Stearns and Lehman highlighted the risk that highly leveraged firms face from collateral "fire sales" — the risk that the forced liquidation of asset

holdings can dramatically depress the market prices for collateral and thereby set off a vicious cycle that culminates in a run. This risk is greatest when a firm's assets are risky, opaque, and therefore illiquid — a description that fit much of the two firms' holdings of mortgage-backed securities.

The tendency toward a vicious cycle appears to have been amplified in the tri-party repo market by lenders' behavior in the face of declining and uncertain collateral valuations. Several studies have examined the discounts — known as "haircuts" — that tri-party repo lenders applied to reported collateral valuations as the crisis unfolded. A well-known 2010 study by Adam Copeland, Antoine Martin, and Michael Walker of the New York Fed found that lenders in the tri-party repo market generally did not increase collateral haircuts in response to increased counterparty risk during the financial crisis. Rather, lenders were more inclined to require higher-quality collateral or deny lending altogether. This behavior likely contributed to the precipitousness of the Bear Stearns and Lehman collapses.

A great deal of risk was rooted in the tri-party market's structure. The U.S. tri-party repo market was dominated by two clearing banks, BNY Mellon and JPMorgan Chase. According to regular practice, all tri-party repo contracts (even multiday contracts) would be unwound on a daily basis — meaning that collateral would be shifted back to a borrower's securities account at its clearing bank and cash would be shifted back into the lender's cash account at the same clearing bank. This had the advantage of giving borrowers maximum flexibility to use their collateral intraday, but it had the disadvantage of regularly leaving clearing banks with huge intraday exposures to repo borrowers. It was not uncommon for a single broker-dealer to owe its main clearing bank more than $100 billion intraday.

This feature of the tri-party repo added an additional layer of complexity to a risky game. In the midst of the crisis, repo lenders not only had to be wary of other repo creditors quickly exiting the market and leaving them "holding the bag," they also had to be wary of clearing banks deciding not to execute the daily unwind, which could leave repo lenders similarly exposed.

"Repo lenders are not interested in taking possession of collateral, and if they think they are going to be left holding it, they will say 'No, I won't lend to you,'" says Richmond Fed economist Huberto Ennis, who has studied strategic behavior in the tri-party repo market. "And if they think that the clearing bank is not going to unwind the next morning, they are going to be happy holding onto their cash and losing one night's interest."

Post-Crisis Reforms

The Task Force on Tri-Party Repo Infrastructure, which was formed to explore the market's problems, urged a number of changes to lower risk. In accord with task force recommendations, the clearing banks discontinued the daily unwind for nonmaturing loans. In addition, they substantially reduced their extension of intraday credit.

The crisis also led to major changes in monetary policy that fundamentally affected the functioning of repo markets. "The Fed's old system had been to target the federal funds rate by doing small, but regular, repo lending operations to adjust the supply of bank reserves," says William English of Yale University. "But this wasn't going to work anymore under quantitative easing. What ended up working, at least at first, was paying banks a set rate of interest on their reserves."

Before the financial crisis, the Fed had seldom borrowed funds in the repo market by engaging in what are called "reverse repos." But this changed in 2014 after the Fed's acceleration of quantitative easing caused short-term interest rates to decline below the rate the Fed paid banks on their reserves. At that point, the Fed created the Overnight Reverse Repurchase Agreement Facility to stand ready to borrow funds from certain firms, including mutual funds, at a set rate. This helped the Fed reestablish a floor for market rates. Under this new system of interest rate targeting, which combined paying interest on bank reserves with the reverse repo facility, the Fed largely refrained from repo market lending — this is, until September 2019.

The financial crisis also gave rise to changes in bank regulation and supervision. Perhaps the most consequential changes for repo markets pertained to supervisory guidance and the use of stress tests.

Rate Spikes of Sept. 17, 2019

Prior to September 2019, it had become quite unusual for the benchmark interest rate for repos, known as the Secured Overnight Financing Rate (SOFR), to vary widely from the rate that the Fed paid banks on their excess reserves (IOER). During the year prior to Sept. 17, 2019, the SOFR-IOER spread had become somewhat more volatile as the Fed had continued to reverse its quantitative easing program and reduce the supply of banking system reserves. But the spread had exceeded 0.25 percentage points only five times during the period and had never exceeded 0.75 percentage points. (See chart.)

Thus, it came as a shock to market participants when, on Sept. 17, the SOFR benchmark repo rate spiked to 5.25 percent even though IOER stood at only 2.1 percent.

Initial accounts of the repo rate spike focused on the closely proximate occurrence of a Treasury securities auction and a due date for quarterly corporate tax payments. Both of these events involved large payments from the private sector to the U.S. Treasury's general account at the Fed. Such transactions, if not offset by Fed open market operations or discount window lending, reduce banking system reserves at the Fed and thus tend to reduce the banking system's supply of funds to the repo market. The Treasury auction had the further effect of increasing the demand for funds in the repo market by securities dealers looking to finance Treasury securities purchases.

These factors would tend to put upward pressure on repo rates, but it was puzzling afterward to some observers that banks failed to take advantage of the repo rate spike by lending their excess reserves in the repo market. Such a trade seemed as if it would be a simple arbitrage opportunity, with a gain equal to the SOFR-IOER spread. But this did not happen on Sept. 17, or at least not enough to keep the repo rate from spiking.

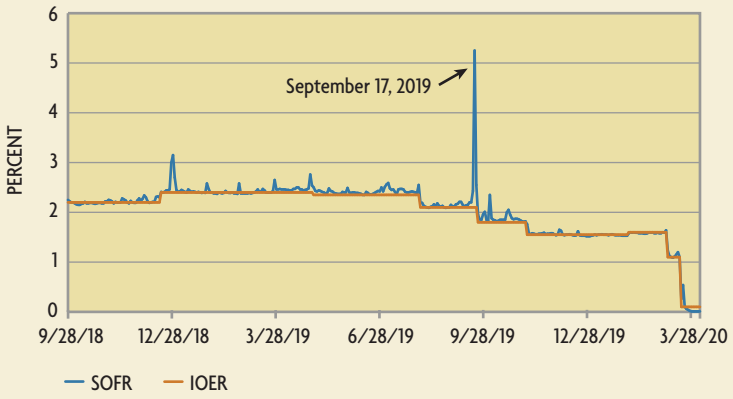
One potential explanation is that the potential arbitrage gains for banks were just not that big. Even when the SOFR-IOER spread widens to 3.15 percentage points, as it did on Sept. 17, the gain for a one-day trade amounts to less than 0.01 percentage points. "With capital being so carefully allocated across bank business lines these days, repo desks just don't have the nimbleness to act on the type of spreads seen on Sept. 17," says William Nelson, chief economist for the Bank Policy Institute. "However, if that type of spread had persisted, you might have seen more trading."

There has been much discussion about the role of bank regulation and supervision in the spike. Postcrisis regulations do not appear to have played a major role in the reluctance of banks to lend in the repo market. For instance, the Liquidity Coverage Ratio (LCR) — designed to make sure banks have enough high-quality liquid assets — treats Treasuries as equal to reserves. Thus, in theory, the LCR should not have discouraged banks from lending in the repo market, provided that the lending was collateralized by Treasury securities.

But bank supervisory guidance may have played an important role. Under the Fed's postcrisis policy of abundant reserves, banks and their supervisors have become more accustomed to banks operating with large reserves. And market observers have suggested that banks — perhaps wary of increased supervisory scrutiny — have become more conservative in their reserve management and more reluctant to run daylight overdrafts. "The largest banking institutions manage so many settlements. ... The quantum is enormous. It varies, both in the size ... as well as in the timing," according to Sandra O'Connor, former chief regulatory affairs officer at JPMorgan Chase, who spoke at a Brookings Institution panel in December 2019. In her view, banks use their excess reserves as shock absorbers to ensure they don't breach intraday overdraft, because there's a stigma associated with it. Consequently, "there's a lot less willingness to lend out that last dollar because it could result in an overdraft."

Repo Rate Spike

Repo Rate (SOFR) vs. Interest Rate on Excess Reserves (IOER)



SOURCE: Federal Reserve Board via FRED

Banks' conservative approach to reserve management appears to have been reflected in their internal stress tests, which they use to make contingency plans for periods of market stress and illiquidity. Fed Vice Chair Randal Quarles has suggested that banks' internal stress tests may have played a role in the rate spike by creating too great a preference for central bank reserves over other high-quality liquid assets, including Treasuries.

More Changes?

There has been no shortage of policy proposals to avoid a repeat of the Sept. 17 rate spike. A prominent proposal has been the creation of a "standing repo facility." This program would have the Fed actively capping the repo rate by standing ready to lend at a specified target rate — presumably equal to, or close to, the federal funds target. The Fed is also looking at alternative ways to enhance repo market liquidity, such as encouraging banks to more fully incorporate discount window access into their internal stress tests.

As a practical matter, the Fed has been actively lending in the repo market since Sept. 17 — after a nearly 10-year hiatus — and has more recently promoted market liquidity by activating a number of credit programs, including the PDCF.

The repo market has rarely sat still for long. After having undergone a major legal and structural transformation in the 1980s, its functioning was fundamentally altered by the 2008-2009 financial crisis. Faced with the current crisis, it appears poised for further change. **EF**

Readings

Copeland, Adam, Antoine Martin, and Michael Walker. "The Tri-Party Repo Market before the 2010 Reforms." Federal Reserve Bank of New York Staff Report No. 477, November 2010.

Ennis, Huberto M. "Strategic Behavior in the Tri-Party Repo Market." Federal Reserve Bank of Richmond *Economic Quarterly*, Fourth Quarter 2011, vol. 97, no. 4, pp. 389-413.

"Final Report." Task Force on Tri-Party Repo Infrastructure, Feb. 15, 2012.

Garbade, Kenneth D. "The Evolution of Repo Contracting Conventions in the 1980s." Federal Reserve Bank of New York *Economic Policy Review*, May 2006, vol. 12, no. 1, pp. 27-42.

INTERVIEW

Joshua Angrist

On charter schools, the elite illusion, and the "Stones Age" of econometrics

As a teenager growing up in Pittsburgh, Joshua Angrist became fed up with high school and said his goodbyes to it after his junior year. Today, at the Massachusetts Institute of Technology, he's a top researcher in labor economics and the economics of education — with work that includes a series of famed studies of policy choices for K-12 schooling.

Much of his work has been based on ingenious "natural experiments," that is, episodes in which two or more groups of people were randomly exposed to different policies or different experiences. Such occurrences are an opportunity for Angrist and his co-authors to use the tools of econometrics to assess the effects of those differences — whether that's a large classroom versus a small classroom or education at a charter school versus education at a conventional public school.

Angrist's first natural experiment looked at labor market outcomes for men who were drafted during the Vietnam War era compared with those of men who weren't drafted. The idea came to him from his labor economics teacher and Ph.D. adviser at Princeton, Orley Ashenfelter, who mentioned in class one day that he had seen a news article about a study in the *New England Journal of Medicine* in which epidemiologists investigated the long-term health effects of being drafted.

"They had done this very clever thing where they used the fact that draft lottery numbers were randomly assigned," Angrist remembers, "and they compared people who had high and low numbers to test the causal effects."

Ashenfelter remarked to the class that this use of the draft lottery was a great idea and that somebody should use it to look at the effects of the draft on the men's earnings. Angrist agreed; immediately after class, he went to the library to start the research that became his doctoral thesis.

Angrist found that in the early 1980s, well after the end of the war, veterans — whether they served in Vietnam or elsewhere — took an earnings hit of around 15 percent compared with non-veterans in the same period. (Angrist himself served as a paratrooper in the Israeli army before he went to grad school.)

In addition to his research and teaching responsibilities at MIT, Angrist is a co-founder and co-director of MIT's School Effectiveness and Inequality Initiative. He is the author, with Jörn-Steffen Pischke, of the econometrics textbooks *Mostly Harmless Econometrics: An Empiricist's Companion* (2009) and, for undergraduates, *Mastering 'Metrics: The Path from Cause to Effect* (2015). He also teaches econometrics in a series of free videos offered through the nonprofit Marginal Revolution University.

PHOTOGRAPHY: LIESL CLARK

David A. Price interviewed Angrist via videoconference in March 2020.

EF: You left high school early and then took a while to decide to go to college. Why?

Angrist: I wasn't a very good high school student. I didn't pay much attention to school, and I didn't go very often. I also liked to work because I wanted money. So I started working as a busboy, and I liked having money because money is good when you're a teenager. Then I thought, well, I'll just leave school if I can and go work full time.

I figured out that the Pennsylvania high school graduation requirements were pretty minimal. So I was able to graduate with a bare bones diploma after my junior year. Then I worked for a while, mostly in institutions for the intellectually disabled because I had experience with this kind of work at summer camp. But from my work experience, I realized I should probably go to college.

EF: Was there anything in particular that brought home to you the idea that you should go to college?

Angrist: I saw that the work was not that interesting. And it wasn't clear where it would lead. So I got bored.

> "Empiricists should work on stuff that's nearby. Then you can have some visibility into what's unique."

EF: At some point, you became interested in economics. How did that happen?

Angrist: Because of the work I'd been doing, I thought I would go into special education, so I took a psych course. But I also took Econ 101, and I had a wonderful economics teacher, a man named Bob Piron. At least he was very much to my taste. He was funny. He was provocative. He would call on people; he would tease people. Today, I suppose he would get fired for this, but as a teacher, I try to do a version of what he did that's a little more in tune with the times.

Piron was clear as a bell, and he was challenging, and I just enjoyed the whole thing. So I thought, I want more of this. I guess there was also the fact that I did like the material and I had an affinity for it. I started taking all the econ I could get and all the math I could stomach.

I also experienced another example of the power of having good teachers. Oberlin, where I went, is a small liberal arts college. It has a good economics department and they invite their best seniors to write a thesis, so I did it. What Oberlin does that's very nice is they invite an outside examiner, somebody who is a well-known researcher. They invited Orley Ashenfelter, a labor economist at Princeton.

Not everybody wants to come to Oberlin for a few days, but Orley did that; he's that kind of person. I met him and got to know him a little bit and he took a shine to me, I was lucky, and he said, "Why don't you come to Princeton?" So after I graduated from Oberlin and after my Israeli army service, I went to graduate school at Princeton because of him and to work with him.

CLASS SIZE

EF: A lot of your recent research has focused on evaluating K-12 schools and education policies. One of your many well-known articles in this area found that limits on class size were associated with higher test scores for fourth and fifth graders in Israel. How did that work come about?

Angrist: It came out of the fact that I was living in Israel at the time and was working with Victor Lavy. He was my main collaborator while I was on the faculty at Hebrew University. Victor and I started writing papers about Israeli schools and have continued to do so ever since.

One thing I learned is that empiricists should work on stuff that's nearby. Then you can have some visibility into what's unique and try to get on to projects that other people can't do. This is particularly true for empiricists who are working outside the United States. There's a temptation to just mimic whatever the Americans and British are doing. I think a better strategy is to say, "Well, what's special and interesting about where I am?"

And it turned out that the Israeli school system had a lot of interesting things going on. One was that they had a rule about class size that can actually be dated back to the Talmud. Even though the details of the rule have changed, we call it Maimonides' Rule, because the biblical sage and scholar Moses Maimonides had said in the 13th century that that's what you're supposed to do.

If you're in a grade cohort of 41, they'll split your class because you're over the cap of 40; if you're in a cohort of 39, you'll stay lumped. So you get a nice natural experiment there. I think that paper is more methodologically significant than substantive in that it was one of the first of a wave of regression discontinuity studies. But we did find that larger class sizes reduced test scores. It's a story of selection bias: Larger classes are in the areas that are more densely populated, and in Israel in particular, that's urban areas and richer people.

A couple of years ago, Victor and I went back with much more data, and we replicated the Maimonides study again on Israel. In the original study, we had two years of data, from '91 and '92. But then in a study published earlier this year in *American Economic Review: Insights*, Victor and I and two of our graduate students — one from Israel, Adi Shany, and one from MIT, Jetson Leder-Luis — collected a lot more data and we reestimated the whole thing. We did not get the original finding, actually. In the newer, much larger sample, there's not much relationship, basically none, between class size and achievement.

I can't say that we actually figured out why it changed. Overall, classes have gotten smaller in Israel; maybe we're into a zone where it doesn't matter much anymore. It used to be Israeli classes were quite large, in the high 30s. Now they're more like in America. So that's one possibility. It could also be that the earlier estimates were kind of noisy and we got lucky, and when we had more precision, we didn't see anything.

So the original Maimonides finding doesn't hold up. I think there are other, more robust effects in education, like the effects of no-excuses charter schools, that have been replicated over and over by me and others. That seems more robust than the class size effect.

CHARTER SCHOOLS AND "NO EXCUSES"

EF: As you point out, you found benefits to students from attending charter schools in Boston or from attending a KIPP charter school. What were the benefits, and where do they seem to have come from?

Angrist: We've studied lots of charter schools. We have a research organization at MIT called SEII, the

Joshua Angrist

➤ Present Positions
Ford Professor of Economics, Massachusetts Institute of Technology
Co-Director, MIT School Effectiveness and Inequality Initiative

➤ Selected Additional Affiliations
Research Associate, National Bureau of Economic Research
Instructor, Marginal Revolution University

➤ Selected Past Positions
Associate Professor of Economics, Massachusetts Institute of Technology (1996-1998); Associate Professor of Economics, Hebrew University (1995-1996); Senior Lecturer in Economics, Hebrew University (1991-1995); Assistant Professor of Economics, Harvard University (1989-1991)

➤ Education
Ph.D. (1989), Princeton University; B.A. (1982), Oberlin College

School Effectiveness and Inequality Initiative, that does research on human capital. It's run by Parag Pathak, David Autor, and me. We have a K-12 division and a higher education division. The K-12 division has looked at a lot of school reform ideas: We've looked at charters of various types; we've looked at takeovers, where a low-performing public school is given over lock, stock, and barrel to an outside manager; we've looked at vouchers.

Charters of a particular type known as "no-excuses charters" are very effective. They're prevalent in large and urban districts, like Boston, New York, Washington, New Orleans, and Chicago. They serve low-income students, mostly minority, and many of them are organized in what are called charter management organizations, which are networks that are like franchises. KIPP is a big one.

And they have a model that seems to work. It's partly that they have a lot of inputs, so they have a long day and a long year. Actually, my daughter teaches at one, so we always have to plan our vacation around the fact that she starts teaching Aug. 1, a full month ahead of the traditional schools. She has very long workdays: Her day starts early, ends late, and in the evenings, she's on the phone with parents. Her experience is representative.

Some other things that set no-excuses charters apart are that they emphasize traditional reading and math, they have an emphasis on discipline and comportment, they have low-stakes rewards, they use data intensively, they observe the teachers quite often, and they give the teachers a lot of feedback. They also tend to target standardized tests because that's part of their accountability system.

But there are other charters that aren't nearly as good. Some of them are bad, at least as far as achievement goes. We have a paper on Massachusetts charters that shows that the suburban charters that are not in this no-excuses paradigm tend to take middle-class and upper middle-class children and reduce their achievement. It's not visible to the parents, because basically everybody does OK, but if you use the charter admissions lotteries to estimate causal effects, you get a negative effect.

EF: Does your work and the work of your colleagues tell us anything about where the gains are coming from?

Angrist: It seems to be a mix of things. The practices of the no-excuses schools are highly correlated, so you don't really get one-at-a-time randomization, even when admissions are randomized. We do see that it's not enough just to have more instruction time. It looks like other things are important too. It isn't the level of traditional resources, though; for instance, their classes are not smaller. And it isn't peer effects. Mostly the kids in these schools come in as very low achieving.

EF: Have you looked at college completion?

Angrist: We've looked at longer-term outcomes related to college completion, but it's a work in progress because you have to wait a long time. Many of the students we study are going to middle school, then they have to go to high school, then they have to get into college. We have a paper on Boston charter effects on college enrollment and persistence. We're working on extending that.

EF: Are there problems with assessing schools' success on the basis of achievement scores?

Angrist: The main problem might be teaching to the test and that's at the expense of something else. I'm not too worried about that, because what we show in our paper is that schools that boost test scores tend to boost college. And we think college is unambiguously good.

We're not the only ones to link achievement value-added with longer-term outcomes. Raj Chetty has some work on that where it's pretty convincing that if you go to a school that boosts achievement, you're going to have higher earnings, for example. But our holy grail here is to get data on longer-term outcomes, like earnings. And I think we will.

EF: You've also found, with co-authors, that takeovers of public schools in New Orleans and Boston led to substantial gains for students. How did you determine this, and why were the schools more effective after the takeovers?

Angrist: The charter world has many variations. The most common charter model is what we call a startup — somebody decides they want to start a charter school and admits kids by lottery. But an alternative model is the takeover. Every state has an accountability system with standards that require schools to meet certain criteria. When they fail to meet these standards, they're at risk of intervention by the state. Some states, including Massachusetts, have an intervention that involves the public school essentially being taken over by an outside operator.

Boston had takeovers. And New Orleans is actually an all-charter district now, but it moved to that as individual schools were being taken over by charter operators.

That's good for research, because you can look at schools that are struggling just as much but are not taken over or are not yet taken over and use them as a counterfactual. The reason that's important is that people say kids who apply to the startups are self-selected and so they're sort of primed to gain from the charter treatment. But the way the takeover model works in Boston and New Orleans is that the outside operator inherits not only the building, but also the existing enrollment. So they can't cherry-pick applicants. What we show is that successful charter management organizations that run successful startups also succeed in takeover scenarios.

THE ELITE ILLUSION

EF: You've looked at the question of how much peers matter. Many parents obviously seek schools where they believe their children will have higher-quality peers, whatever they may mean by that term. You and your co-authors have looked at Boston and New York City selective public schools, and you concluded that peer effects don't seem to matter much. Why is that?

Angrist: I'm always beating that drum. I think people are easily fooled by peer effects. Parag, Atila Abdulkadiroglu, and I call it "the elite illusion." We made that the title of a paper. I think it's a pervasive phenomenon. You look at the Boston Latin School, or if you live in Northern Virginia, there's Thomas Jefferson High School for Science and Technology. And in New York, you have Brooklyn Tech and Bronx Science and Stuyvesant.

And so people say, "Look at those awesome children, look how well they did." Well, they wouldn't get into the selective school if they weren't awesome, but that's distinct from the question of whether there's a causal effect. When you actually drill down and do a credible comparison of students who are just above and just below the cutoff, you find out that elite performance is indeed illusory, an artifact of selection. The kids who go to those schools do well because they were already doing well when they got in, but there's no peer effect from being exposed to higher-achieving peers.

We also have papers where we show that the elite illusion is not just a phenomenon relevant for marginal kids. This is in response to an objection that goes, "If you're the last kid admitted to Stuyvesant, it's not good for you because you're not strong enough." We can refute that with some of our research designs.

EF: Are there other school situations where you think peer effects might turn out to be more important?

Angrist: There might be, but a lot of the evidence that I find compelling goes the other way. I teach undergrad and grad econometrics, and one of my favorite examples for teaching regression is a paper by Alan Krueger and Stacy Dale that looks at the effects of going to a more selective college. It turns out that if you got into MIT or Harvard, it actually doesn't matter where you go. Alan and Stacy showed that in two very clever, well-controlled studies. And Jack Mountjoy, in a paper with Brent Hickman, just replicated that for a much larger sample. There isn't any earnings advantage from going to a more selective school once you control for the selection bias. So there's also an elite illusion at the college level, which I think is more important to upper-income families, because they're desperate for their kids to go to the top schools. So desperate, in fact, that a few commit criminal fraud to get their kids into more selective schools.

A theme of my work is that there's a lot of selection bias in simple comparisons. It's good to be skeptical of all strong empirical relationships and ask yourself and others, "Is that statistical connection really a causal effect, or is it just telling me something about the process that generates access to this school or whatever it is?" And the process that generates access to selective colleges and universities is kind of designed to mislead you. People who get into selective colleges and universities are picked because they're people who are likely to be smart and successful.

TECHNOLOGY IN THE CLASSROOM

EF: Going back to K-12, you did research with Victor Lavy on the effect of computer-aided instruction in Israel.

Angrist: Now computer-aided instruction is all the rage — personalized learning, using a lot of technology in the classroom. Victor and I had an early paper on the effects of that, taking advantage of something that happened in Israel.

EF: You found that the expected benefits didn't come to pass and that for some grades the effects were even negative. Any thoughts as to what happened?

Angrist: I'm skeptical of computer-aided instruction. I don't allow any electronics in my classroom. No laptops, no phones of course. They're a huge distraction.

That's actually been shown in a randomized trial by one of my former students, Kyle Greenberg, who's now a professor at West Point. West Point is a college like any other; it has some special features, but they teach college courses and they teach a lot of economics. Kyle and two of his colleagues did a randomized trial on allowing laptops and iPads in the classroom, and the treatment effect of that is a big negative effect.

Another example of that is laptops. The One Laptop per Child program was promoted by people in MIT's Media Lab, and they raised a lot of money for it. Eventually, the

Inter-American Development Bank figured out that they ought to make them show that it's worth doing. And the eventual randomized trial on One Laptop showed little in the way of learning gains.

EF: What started you down the road of looking so much at K-12 education?

Angrist: Well, K-12 education is economically important, but SEII also looks at higher education, which is equally important. We have a big randomized evaluation going on of financial aid, and I've done two randomized trials of financial incentives with Phil Oreopoulos.

Still, K-12 has been of particular interest to me. I think maybe in my personal case, there is a kind of peer effect in the sense that when I was in Israel, I was working with Victor Lavy and he was interested in that. And at MIT, my research direction was influenced by the arrival of Parag Pathak, who does a lot of work on market design. And Parag's thesis work was on school choice.

THE FUTURE OF ECONOMETRICS

EF: You've co-authored two econometrics texts and you teach the subject online through Marginal Revolution University. You've written that you "hope to bring undergraduate econometrics instruction out of the Stones Age." What did you mean by that?

Angrist: That comes from an article Steve Pischke and I wrote. Steve is my co-author on the books and an old friend of mine. Steve and I noticed that the way econometrics is taught is divorced from the way modern empirical work is carried out. The conventional econometrics course devotes a lot of time to things that aren't very important, like heteroskedasticity and generalized least squares, and little or even no time to questions of research design, how to figure out whether something affects something — in other words, causality — and how you should interpret regression estimates. Steve and I tackled that in our graduate book, *Mostly Harmless Econometrics*, and we followed up in *Mastering 'Metrics* for undergrads.

The Stones Age idea is that the Stones are an awesome band, but their heyday was the '70s. And even though modern empirical econometric research looks nothing like 1970s econometrics, econometrics instruction for the most part looks just like it looked in 1975.

EF: What do you think the relationship will be between econometrics and tools such as neural networks?

Angrist: I just wrote a paper about machine learning applications in labor economics with my former student Brigham Frandsen. Machine learning is a good example of a kind of empiricism that's running way ahead of theory. We have a fairly negative take on it. We show that a lot of machine learning tools that are very popular now, both in economics and in the wider world of data science, don't translate well to econometric applications and that some of our stalwarts — regression and two-stage least squares — are better.

But that's an area of ongoing research, and it's rapidly evolving. There are plenty of questions there. Some of them are theoretical, and I won't be answering those questions, but some are practical: whether there's any value added from this new toolkit. So far, I'm skeptical.

EF: What are you working on now?

Angrist: We're writing up the results from our randomized evaluation of financial aid. That's been six years in the making, maybe more. I'm also doing a lot of work on value-added models for schools with a team from SEII.

Older problems where I think there's still some work to be done include the question of how to deal with weak instruments. An instrumental variable is something that's randomly assigned, or as good as randomly assigned, that provides or induces variation in something that you're interested in studying the effect of.

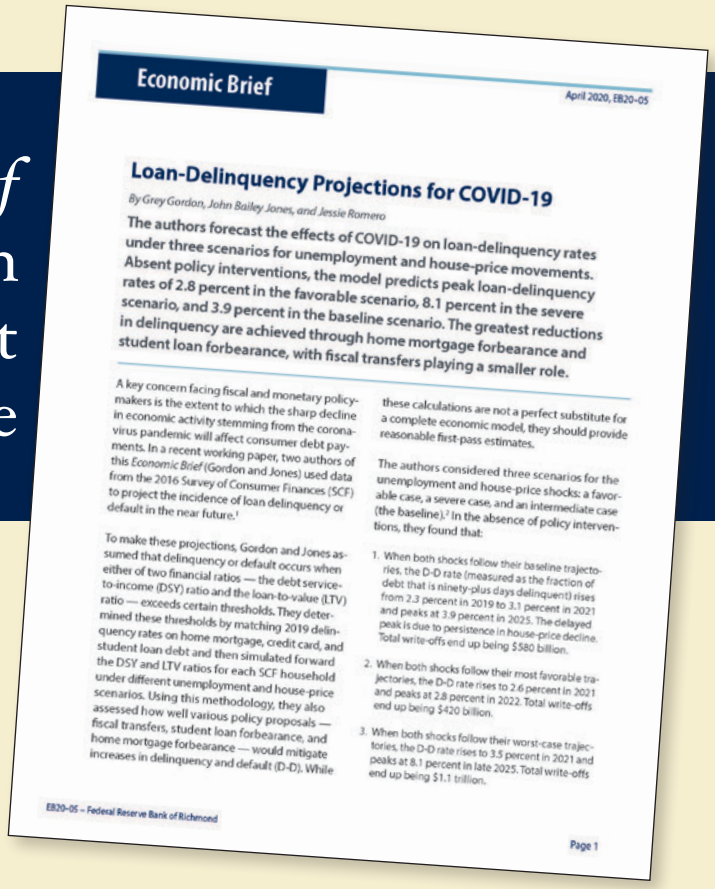
My interest in this originated as a result of work inspired by a 1991 paper with Alan Krueger using quarter of birth to construct instruments for schooling. In some models, we had lots of interactions and some of the interactions don't contribute much. John Bound, David Jaeger, and Regina Baker famously showed in a 1995 article that some of the resulting estimates are biased. That's the weak instruments problem. It produced a lot of work trying to address that problem, and an amazing thing is that there are still open questions there and these issues have practical consequences.

One area that I think is ripe for the picking is application of the microeconometric tools for the discovery and estimation of causal relationships to questions in macro — for instance, to the effects of monetary policy, which is a very well-defined causal question and in principle could be answered by a randomized trial.

In fact, Bob Lucas has an essay where he described how he would study monetary policy using an experiment at an amusement park near Pittsburgh. The park is called Kennywood Park, and he wrote about Kennywood because at the time he was in Pittsburgh at Carnegie Mellon. What he found interesting about Kennywood is that it had at the time, I don't know if it still does, its own currency. You didn't spend dollars in Kennywood, you spent Kennywood tickets. And so they could experiment if they wanted with their currency, they could print more of it and so on.

Lucas explained how you could use the Kennywood world to discover causal effects. I'd like to see that reasoning applied more often in real empirical work in macro. That is happening, but I think the causal empirical macro agenda should be pursued more aggressively. **EF**

Economic Brief
An online essay each month about a current economic issue


Economic Brief

April 2020, EB20-05

Loan-Delinquency Projections for COVID-19

By Grey Gordon, John Bailey Jones, and Jessie Romero

The authors forecast the effects of COVID-19 on loan-delinquency rates under three scenarios for unemployment and house-price movements. Absent policy interventions, the model predicts peak loan-delinquency rates of 2.8 percent in the favorable scenario, 8.1 percent in the severe scenario, and 3.9 percent in the baseline scenario. The greatest reductions in delinquency are achieved through home mortgage forbearance and student loan forbearance, with fiscal transfers playing a smaller role.

A key concern facing fiscal and monetary policymakers is the extent to which the sharp decline in economic activity stemming from the coronavirus pandemic will affect consumer debt payments. In a recent working paper, two authors of this *Economic Brief* (Gordon and Jones) used data from the 2016 Survey of Consumer Finances (SCF) to project the incidence of loan delinquency or default in the near future.[1]

To make these projections, Gordon and Jones assumed that delinquency or default occurs when either of two financial ratios — the debt service-to-income (DSY) ratio and the loan-to-value (LTV) ratio — exceeds certain thresholds. They determined these thresholds by matching 2019 delinquency rates on home mortgage, credit card, and student loan debt and then simulated forward the DSY and LTV ratios for each SCF household under different unemployment and house-price scenarios. Using this methodology, they also assessed how well various policy proposals — fiscal transfers, student loan forbearance, and home mortgage forbearance — would mitigate increases in delinquency and default (D-D). While these calculations are not a perfect substitute for a complete economic model, they should provide reasonable first-pass estimates.

The authors considered three scenarios for the unemployment and house-price shocks: a favorable case, a severe case, and an intermediate case (the baseline).[2] In the absence of policy interventions, they found that:

1. When both shocks follow their baseline trajectories, the D-D rate (measured as the fraction of debt that is ninety-plus days delinquent) rises from 2.3 percent in 2019 to 3.1 percent in 2021 and peaks at 3.9 percent in 2025. The delayed peak is due to persistence in house-price decline. Total write-offs end up being $580 billion.
2. When both shocks follow their most favorable trajectories, the D-D rate rises to 2.6 percent in 2021 and peaks at 2.8 percent in 2022. Total write-offs end up being $420 billion.
3. When both shocks follow their worst-case trajectories, the D-D rate rises to 3.5 percent in 2021 and peaks at 8.1 percent in late 2025. Total write-offs end up being $1.1 trillion.

EB20-05 – Federal Reserve Bank of Richmond

Page 1


Economic Brief

December 2019, EB19-12

Predicting Recessions

By Matthew Mugerby, Jessie Romero, and Roy Webb

This *Economic Brief* evaluates the predictive capabilities of the yield curve and several other leading indicators, including the Conference Board Leading Economic Index (LEI), claims for unemployment insurance, manufacturing activity, consumer lending, and CEO optimism. According to in-sample statistical analysis, several indicators — particularly the three-month/ten-year term spread and the LEI — have demonstrated significant value in predicting recessions during the past sixty years.

The current cyclical expansion in the United States has lasted more than ten years, the longest on record. Although the duration of the expansion alone is not necessarily evidence that a recession is becoming more likely,[1] speculation has increased that a downturn is coming. This has been heightened by low rates on longer-term U.S. Treasury securities relative to shorter-term securities; in mid-2019, for example, the yield on ten-year notes actually dipped below the yield on three-month bills. Such an "inversion" of the yield curve typically has preceded recessions. (See Figure 1 on the following page.) This *Economic Brief* evaluates the predictive capabilities of the yield curve and several other indicators, including the Conference Board Leading Economic Index (LEI), claims for unemployment insurance, manufacturing activity, consumer lending, and CEO optimism.

A challenge for this analysis is that there have been only eight recessions over the past sixty years. As a result, a small number of observations determines the relative performance of the various predictor variables. In addition, the analysis uses reduced-form regressions, raising the possibility that the regression coefficients are unstable. (See the box on the following page for details on the regression analysis. Full results are available from the authors.) Accordingly, the goal of this brief is not to assert with certainty that any one indicator (or combination of indicators) can always predict recessions, but rather to identify variables worth following for real-time analysis of economic conditions.

Term Spreads

A plot of interest rates by maturity is referred to as a yield curve, and the difference between a longer-term yield and a shorter-term yield is called a term spread.[2] In general, investors expect long-term rates to be higher than short-term rates because longer-term investments are subject to greater risk. When long-term rates are below short-term rates, the yield curve is said to be inverted. A large body of economic research has found that yield-curve inversions are associated with — and can predict — recessions.[3] As Luca Benzoni, Olena Chyruk, and David Kelley explain in a 2018 *Chicago Fed Letter*, this relation-

EB19-12 – Federal Reserve Bank of Richmond

Page 1

ship could arise through the interplay of monetary policy and market participants' expectations.[4] The interest rate on a long-term bond reflects investors' beliefs about the path of short-term interest rates. If market participants expect the Federal Open Market Committee (FOMC) to lower interest rates in the future, for example in response to slowing economic activity, this would lead to lower long-term rates. ...ely, market participants might expect the ...o raise interest rates in response to rising ...; this would both increase short-term rates ...to long-term rates and increase the odds ...ure contraction.

...of analyzes the forecasting performance ...term spreads that have been discussed in ...atures: three-month and ten-year Treasuries, ...onth and five-year Treasuries, and two-year ...-year Treasuries. Consistent with previous ..., each term spread is a significant predic-

REGRESSION ANALYSIS DETAILS

Several variables were examined for their ability to predict recessions. A binary variable, the recession indicator, was constructed, taking a value of 1 in month *t* if that month is in a recession, as defined by the National Bureau of Economic Research, and 0 otherwise. In this analysis, the recession indicator has a lead of three to twelve months relative to the independent variable. Logit regressions were used to estimate recession probabilities, with the dependent variable being the recession indicator. Several other variables were evaluated as independent variables. Regressions were estimated by maximum likelihood. Pseudo-$R2$ and t statistics were calculated. Since the dependent variable leads the independent variable, the fitted values can be interpreted as probabilistic forecasts. Other statistics from the regressions also were used to evaluate the independent variables.

...Ten-Year Treasury Yield vs. Three-Month Treasury Yield

...Three-Month Yield — Ten-Year Yield

...Board of Governors of the Federal Reserve System via Haver Analytics
...Data end in October 2019. Shaded areas indicate recessions.

Page 2

To access *Economic Brief* and other research publications, visit www.richmondfed.org/publications/research/

April 2020
Loan-Delinquency Projections for COVID-19

April 2020
Understanding Discount Window Stigma

March 2020
Who Values Access to College?

February 2020
Presidential Politics and Monetary Policy: Lessons from the 1896 Election

January 2020
Asset Bubbles and Global Imbalances

December 2019
Predicting Recessions

November 2019
Linking Municipal Defaults to Inward Migrations

October 2019
A Closer Look at Japan's Rising Consumption Tax

September 2019
Projecting Unemployment and Demographic Trends

Electrifying Rural America

During the Great Depression, communities banded together to bring electricity to America's farmland.

BY TIM SABLIK

The electric industry that powers so much of modern life was originally born out of a desire for better lighting. At the turn of the 19th century, people relied on candles or oil and gas lamps to light their homes. While these sources produced some light, they also gave off heat and smoke and required fuel and regular maintenance. The introduction of electric lighting, first arc lamps in the 1870s for city streets followed by the incandescent light bulb in the 1880s, heralded a much brighter future.

Electricity was initially a novelty for the rich, but utility companies soon discovered ways to take advantage of economies of scale in power generation and distribution, making it more affordable and accessible. Inventors created new machines using electric power in factories and homes, spurring growing demand. As a result, by the end of the Roaring '20s, most American cities were electrified. City dwellers enjoyed brightly illuminated homes and streets, indoor heating, and modern appliances like electric stoves.

Access to electricity was far from universal, however. By 1930, nearly nine in 10 urban and nonfarm rural homes had access to electricity, but only about one in 10 farms did. It wasn't that farmers had no use for electricity. In 1923, the National Electric Light Association, a trade organization of electric companies, conducted a study in Red Wing, Minnesota, where a handful of farms were given access to electricity and electric appliances. Those households reported significantly higher productivity and happiness.

In the Red Wing experiment, electricity was provided to farmers free of charge. But most utility companies balked at the cost of connecting farmers to the grid. Most farms were in remote places, far from the cities where municipal power plants were located. Utilities estimated that it would cost as much as $2,000 per mile — more than $30,000 in 2020 dollars — to build transmission lines out to farms. Additionally, because rural areas were more sparsely populated than cities, utilities could not take advantage of economies of scale. As a result, the costs of electricity for rural customers who did have it were often significantly higher than for urban customers.

Some utilities did extend service to farms, but most remained unconvinced that they would be able to recoup the upfront costs. That meant the electrification of America's farms proceeded at a much slower pace than that of its cities.

A Cooperative Solution

In May 1935, President Franklin Roosevelt issued an executive order creating the Rural Electrification Administration (REA) "to initiate, formulate, administer, and supervise a program of approved projects with respect to the generation, transmission, and distribution of electric energy in rural areas." The REA was part of the suite of public works projects under the New Deal designed to counteract the Great Depression. Congress set aside $100 million ($1.88 billion in 2020 dollars) for the new agency, enabling it to make loans to finance the construction of electricity generation and transmission to rural areas.

Initial meetings between REA leaders and private utilities seemed promising. But when the utilities submitted their proposal to the government, it exceeded the $100 million budget and fell short of the government's goal of widespread coverage. The utilities also maintained that without assistance to help finance the wiring of rural homes and the purchase of electric appliances, farmers would not have enough demand for electricity to make the service sustainable.

Congress would ultimately take that suggestion to heart; in 1936, the Rural Electrification Act formally established the REA as a government agency and authorized it to also make loans to wire homes and to outfit them with lights and appliances. But by then, private utilities had become increasingly reluctant to work with the REA.

"There was some unfavorable language in the loan offers to the private utilities that placed restrictions on what they could do if they took the money, and they couldn't work those details out," says Carl Kitchens, an economic historian at Florida State University who has studied rural electrification.

With private utilities reluctant to get involved, the REA turned to another vehicle that was quite familiar to farmers: the cooperative, commonly referred to as a co-op.

IMAGE: LOUISAN E. MAIMER RURAL ELECTRIFICATION ADMINISTRATION PAPERS, ARCHIVES CENTER, NATIONAL MUSEUM OF AMERICAN HISTORY, SMITHSONIAN INSTITUTION

"When you read books from that era, one of the things people always talk about is how rural communities can solve different problems by forming a co-op," says Price Fishback, an economic historian at the University of Arizona whose research focuses on New Deal programs. "Every county had several co-ops of varying sizes."

A co-op is an organization that is collectively owned by its members, making them both customers and shareholders. Co-ops had a long history in agriculture. Farmers had banded together to share resources and improve their bargaining power for inputs like seed, fertilizer, and equipment. But there were few examples of co-ops designed to distribute electricity — only 33 electric co-ops existed in the United States in 1930.

Once the REA decided to work with co-ops to accomplish its goals, it set about helping farmers organize. Many states did not have laws in place to govern electric co-ops. So, in 1937, the REA drafted a model Electric Cooperative Corporation Act that states could use as a template for laws authorizing electric co-ops and establishing rules for their governance. The model stated that co-ops were to be nonprofits and governed by member-elected boards, with each member having one vote.

Despite pent-up demand for electricity, acquiring members initially proved a challenge for many co-ops. Farmers were worried that taking loans from the government would put their farms at risk if they defaulted. REA representatives assured them that the electrical equipment itself would serve as collateral for the loans. Membership fees were another sticking point. Co-op members were required to pay $5 to join, a substantial sum in the midst of the Great Depression (equivalent to almost $100 in 2020).

North Carolina farmers were early adopters of the electric co-op model. Farmers in the state had actually been exploring electrification through co-ops before the creation of the REA but were unable to secure the finances they needed to undertake the project. In 1936, residents of Edgecombe and Martin counties formed the first electric co-op in the state, the Edgecombe-Martin County Electric Membership Corp., initially serving 82 members.

The Lights Come On

Once co-ops organized and drafted a proposal, they could borrow at low interest from the REA (between 2 percent and 3 percent) to finance construction of transmission lines and to pay for wiring and appliances for farms and homes. Edgecombe-Martin, for example, received a loan of $32,000 (nearly $600,000 in 2020 dollars) at 2 percent interest. In addition to extending the funding, the REA also helped co-ops find ways to reduce costs.

"The REA hired engineers to help design new ways to build the lines," says Kitchens. Rural electric customers required a different type of load than urban customers, allowing engineers to use single-phase wires and space utility poles farther apart. The REA was also able to make bulk purchases for materials and standardize construction practices to further reduce the per-mile costs.

A worker at the Popes Creek Power Plant in Charles County, Md., in 1941. The plant was financed through loans from the REA.

These techniques allowed the REA to reduce the cost of laying rural power lines to an average of less than $825 per mile by the end of the 1930s — a significant drop from the roughly $2,000 per mile utilities had previously estimated.

Another key feature of the REA program was the extension of credit to wire rural homes and fund purchases of electrical appliances. This ensured a demand for electricity from the start, which allowed the co-ops to take advantage of economies of scale and keep usage costs low. Indeed, a 2020 article in the *Journal of Economic Perspectives* by Kenneth Lee of the Energy Policy Institute at the University of Chicago in India and Edward Miguel and Catherine Wolfram of the University of California, Berkeley, found that this was crucial to the success of rural electrification in the United States compared to electrification efforts in other countries that did not provide such support.

For the most part, rural co-ops did not actually generate power for their members — they purchased it wholesale from private utilities. The REA helped co-ops negotiate terms with utilities, and if they couldn't reach an agreement, the REA stood ready to fund construction of a co-op-owned power source. This threat of competition helped further reduce costs for rural electric customers.

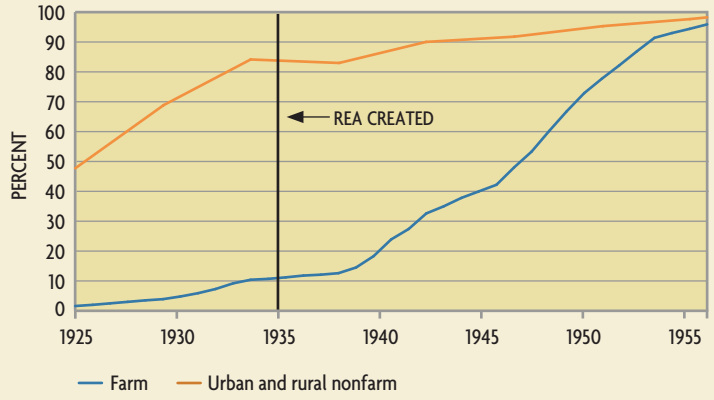
"The REA created competition over territory that hadn't been claimed yet," says Kitchens. "Private power companies operating in cities may have expected that they would have the opportunity to expand into that territory later."

Indeed, in his 2016 book, *Selling Power*, John Neufeld, an emeritus professor at the University of North Carolina at Greensboro, cited the prior lack of competition as one reason why private utilities were initially slow to extend service to rural customers. In the 1920s, when cities were being electrified, the power market was much more competitive, and utilities had an incentive to expand quickly to

IMAGE: 521547, NATIONAL ARCHIVES CATALOG

Electrification of Farms Accelerated after Creation of the Rural Electrification Administration

Share of U.S. Residences with Electricity



SOURCE: U.S. Census Bureau, "Historical Statistics of the United States, Colonial Times to 1970"

claim territory and customers. By the 1930s, many utilities had consolidated under large holding companies and faced less pressure to expand into rural territory, especially when the profitability of doing so was uncertain. The entry of rural co-ops into the market changed that dynamic.

Progress on electrification temporarily slowed with the outbreak of World War II, but by the end of the war, roughly half of the farms in America had power. After another decade, farms had nearly caught up to cities in access to electricity. (See chart.)

As the early Red Wing experiment in the 1920s had hinted, electricity had enormous benefits for farmers. It boosted productivity for dairy farmers thanks to electric milking parlors and refrigerated storage tanks that reduced losses due to spoilage. Electric heat lamps and watering systems improved the egg production of chickens at poultry farms. In many cases, the gains in productivity meant that these and other machines more than paid for themselves. A recent article in the *Journal of Development Economics* calculated farmers' willingness to pay for electricity at $2,400 per farm, or 24 percent of the typical farm's annual income.

Electricity also extended many benefits to rural homes and families. Substituting electric lights for kerosene lamps boosted nighttime illumination and reduced smoke inhalation, improving overall health. Washing machines saved hours of housework — hours that could be reallocated to other tasks. These improved amenities made rural life more attractive, reducing the incentives to move to the city. Electricity also enabled the expansion of other industries in rural communities, such as in the construction and service sectors, leading to long-run economic benefits.

Tackling the Next Last Mile

In the end, most economists agree that the REA-backed co-op model was an enormous success. Virtually all rural Americans received power within a 20- to 25-year period, and almost all of the REA loans were repaid (the default rate was less than 1 percent).

"It was a pretty amazing program," says Fishback. "For a relatively small amount of money, the government got a huge payoff."

The REA still exists today; it is now called the Rural Utilities Service and is part of the U.S. Department of Agriculture. Nearly 900 rural electric co-ops also still operate, providing electric service to their members. Given the success of the co-op model for electrification, some researchers and policymakers have advocated for the same co-ops to oversee the extension of rural broadband, which the Federal Communications Commission (FCC) defines as download speeds of at least 25 megabits per second for fixed-line services. As with electricity in the past, rural communities today are less likely to have access to reliable, fixed-line broadband than cities.

"It's an essential service now," says Ryan Nance, the economic development director of North Carolina's Electric Cooperatives, an organization that serves 26 electric co-ops across the state. "Just look what we're going through right now with the coronavirus and the need for many people to work from home."

In 2018, the FCC opened its Connect America Fund, established to finance the extension of universal broadband service, to electric co-ops for the first time. The FCC's subsequent Rural Digital Opportunity Fund will also be open to co-ops. Electric co-ops in many states, including North Carolina, are taking steps to extend broadband infrastructure to remote communities, reprising their role in bringing electricity to rural America decades ago. **EF**

READINGS

Kitchens, Carl, and Price Fishback. "Flip the Switch: The Impact of the Rural Electrification Administration 1935-1940." *Journal of Economic History*, December 2015, vol. 75, no. 4, pp. 1161-1195.

Lewis, Joshua, and Edson Severnini. "Short- and Long-Run Impacts of Rural Electrification: Evidence from the Historic Rollout of the U.S. Power Grid." *Journal of Development Economics*, March 2020, vol. 143, pp. 1-19.

Neufeld, John L. *Selling Power: Economics, Policy, and Electric Utilities Before 1940*. Chicago: University of Chicago Press, 2016.

"Rural Lines: The Story of the Rural Electrification Administration's First Twenty-Five Years, 1935-1960." Rural Electrification Administration, January 1960.

Rural Population Loss and Strategies for Recovery

BY ALEX MARRÉ

Retaining and attracting new residents is vital to the economic success of rural communities. Population loss translates into fewer customers and workers for local businesses and a diminishing tax base for public services. What do we know about the factors behind past rural population trends? What are current rural population trends in the Fifth District? And what strategies could rural communities pursue to attract new residents?

By definition, rural areas are sparsely populated. Those that grow fast enough become metropolitan areas — that is, counties with 50,000 or more people and outlying counties with at least a quarter of workers commuting to or from the central counties. But rural counties still characterize about 70 percent of our nation's land mass, and many rural communities in those counties want to retain existing residents and attract new ones. Why? Population growth — along with productivity growth — is a key component of economic growth, development, and a rising standard of living.

Rural areas that lose population face a number of problems. One is a shrinking workforce, making it more difficult for businesses to find workers who match their needs. Another problem is that of an aging population with an increasing need for health services, the provision of which is already a struggle as rural hospitals and other care facilities close. (See "Rural Hospital Closures and the Fifth District," *Econ Focus*, First Quarter 2019.) Then there is the problem of a shrinking tax base, which puts pressure on government budgets to fund essential services, such as infrastructure and public schools, that may help attract businesses and workers. In short, as people leave, the people and businesses that remain are generally worse off.

Population decline is a problem for many rural communities across the nation. The Fifth District states of Maryland, North Carolina, South Carolina, Virginia, and West Virginia are not immune. The quest to understand the underlying reasons for the changes in the rural population has led to a body of research that looks at the factors behind locational choices of individuals and households and what factors attract people to rural areas. The answers help determine the choices available to rural communities that hope to grow their population and economy.

Rural Population Loss: A Historical View

The two components of population change are natural change and net migration. Natural change is the number of births minus the number of deaths in a place over a period of time. Net migration is the number of people moving to a place minus the number of people moving out. The factors underlying trends in natural change are less volatile than those behind net migration. Birth and death rates — also called fertility and mortality rates — may be influenced by short-term economic conditions to some degree, but longer-term societal factors, educational attainment, and access to health services all play a role too. In contrast, changes in net migration rates are more likely to be driven by short-run changes in economic conditions and longer-term quality of life factors, such as opportunities for outdoor recreation, a favorable climate, and good schools.

Urbanization has always been a factor in rural population growth in the United States. Since the 19th century, various forces — declining employment in agricultural and extractive industries, the globalization of manufacturing, and economic growth in urban areas — have led many people to leave rural communities for cities and suburbs. Rural population growth slowed for decades, with two rebound periods in the 1970s and 1990s. Economic factors, sometimes termed "regional restructuring," were advanced as an explanation for the partial recovery of rural populations during both periods. Increases in suburbanization were partly responsible for the 1970s and 1990s rebounds, with rural areas that were closer to urban areas benefitting from an increase in demand for housing and an increase in out-commuting. In addition, during the 1970s, the transformation of the urban economy away from industry toward services and a boom in extractive and manufacturing industries in rural areas drew workers to rural areas. In the 1990s, the rebound was aided by an increase in the availability of jobs in rural areas and the advent of telecommuting. The 1990s rebound was also associated with an increase in retiree in-migration and an overall increase in in-migration to rural areas with many natural amenities.

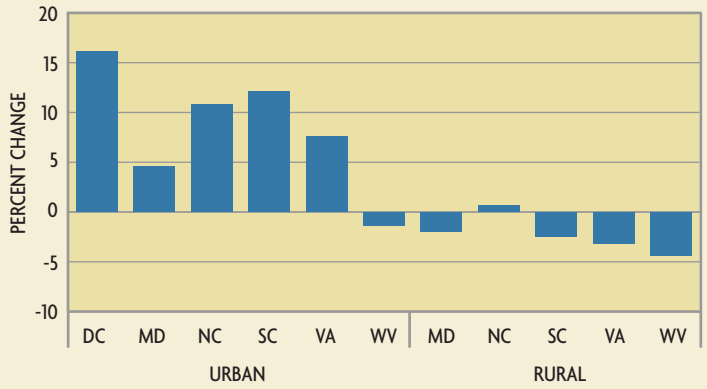
More recently, rural population loss has become more acute. Between 2010 and 2016, rural areas lost population in absolute terms for the first time. In the past, natural increase more than compensated for the number of people moving from rural areas to urban areas. But declines in the number of births and increases in mortality rates for some rural populations have contributed to a bleaker population outlook for rural communities. These trends are likely to continue, meaning that reversing the population decline for rural communities will require working on reducing out-migration and increasing in-migration.

Rural Population Loss in the Fifth District

In many ways, the Fifth District states reflect national trends in rural population decline and rural-to-urban

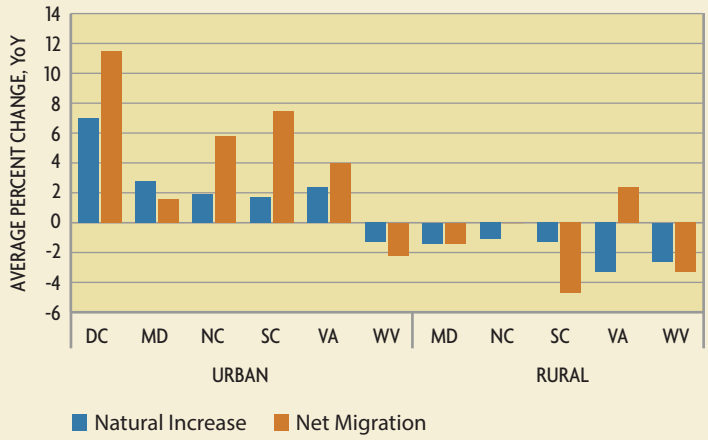
Most Rural Parts of the Fifth District Lost Population in the 2010s

Population change, 2010 - 2018



SOURCE: U.S. Census Bureau annual population estimates

Both Declining Natural Increase and Growing Out-Migration Contributed to Rural Population Loss



NOTES: Values are average county natural increase and net migration rates, year over year, 2011-2018.

SOURCE: U.S. Census Bureau annual population estimates

population shifts. Between 2010 and 2018, the population of the district's most urbanized jurisdiction — the District of Columbia — grew the fastest. Urban areas in the rest of the Fifth District, except in West Virginia, grew much faster than rural areas. Rural populations in four of the Fifth District's five states declined, with a slight gain in North Carolina. (See chart.)

What components of population change mattered most? In the District of Columbia, net migration grew faster than natural increase, although both rates were relatively high in comparison to other jurisdictions in the Fifth District. Other distinct patterns emerge too. The draw of cities in the Carolinas is apparent, likely buoyed by strong job growth in those cities during this period. But those jobs may also have been a draw for residents of South Carolina's rural counties, which saw a fairly sizeable decline in net migration. In rural Virginia, growth in net migration partially counteracted declines in natural increase, while rural Maryland and North Carolina saw declines in both natural increase and net migration. In West Virginia, rural and urban counties both saw declines in natural increase and net migration. (See chart.)

Not shown in these numbers are the characteristics of those who leave. One of the defining characteristics of out-migration from rural areas is age: Young people are the most likely to leave rural areas as they seek new opportunities elsewhere. For many, the new opportunities are going to college or enlisting in the military. For others, it could be seeking employment in more densely populated areas where the jobs are more plentiful. As these younger adults age, they find that urban areas offer an earnings premium over rural areas, especially for those with a college degree. (See chart on next page.) For rural communities, this means that reversing the tide of out-migration entails offering opportunities for young adults to stay and also attracting middle-aged and older adults.

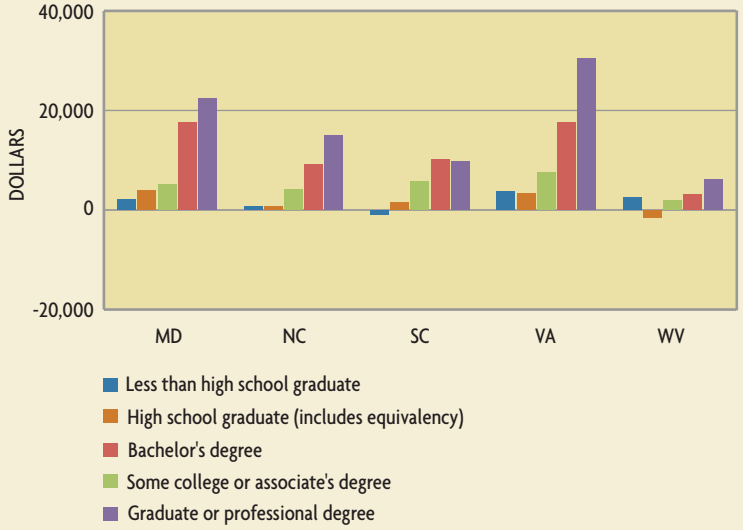
Attracting People to Rural Areas

Local economic conditions play a significant role in attracting new residents. A dynamic, growing job market can attract new people to rural communities in search of work. The reverse is also true, though: Places that attract people are also more likely to be creating jobs. Therefore, isolating the effects of economic conditions on in-migration is a difficult task. A 2015 study by Anil Rupasingha of the U.S. Department of Agriculture, Yongzheng Liu at Renmin University of China, and Mark Partridge of Ohio State University published in the *American Journal of Agricultural Economics* used statistical methods designed to help mitigate the issue. They found that rural counties with higher salaries and job growth were especially effective in attracting workers from urban areas, with local economic conditions having a larger effect for short distance moves. Natural amenities — think scenic landscapes and pleasant climates — matter more in remote rural places for attracting urban residents.

Another strategy is to focus on people's attachments as a way of keeping existing residents and drawing back those who have left. Family ties and attachment to place are strong factors that can oftentimes outweigh strictly economic characteristics when people are deciding where to live. A 2015 qualitative study by John Cromartie of the U.S. Department of Agriculture's Economic Research Service and Christiane von Reichert and Ryan Arthun of the University of Montana used interviews at rural high school reunions to learn why some attendees decided to return to the rural community they grew up in and others did not. The reunions were in 21 towns across the country, resulting in 300 interviews. Most returnees cited family reasons for

Earnings Premium in Urban Areas

Annually by state and level of education



NOTES: Values are in 2018 dollars. Values are differences in median annual earnings by educational attainment for adults ages 25 and older with any earnings.

SOURCE: U.S. Census Bureau, 2018 American Community Survey

returning home. Most were too young to need to care for aging parents, but many returnees decided to move back after becoming parents. Nonreturnees were more likely to be single or married with no intention to have children in the future. Another commonly cited family factor among returnees was the desire to help their parents run a family business. That being said, many people who returned had to accept lower wages and dual-earner couples had trouble finding job matches.

Yet another strategy is to attract retirees. Like many potential movers to rural communities, retirees are pulled by a pleasing climate, such as mild winter temperatures and beautiful views. Unlike for other movers, though, local labor market conditions are less likely to be a factor since retirees no longer need to find work. In a 2016 article in the *Journal of Regional Science*, Jeffrey Dorfman of the University of Georgia and Anne Mandich of Airbnb, then at the University of Georgia, studied senior migration patterns and pointed out that the scenic places retirees are seeking do not always have the health care services that are available in metropolitan areas. They found that health care access measures, such as the number of hospital beds and doctors, are also a draw for retirees. Increasing hospital capacity and hiring more surgeon specialists and general practitioners all had positive effects. Rural communities can position themselves well, therefore, by finding ways to improve access to and quality of health care.

Quality of Life Plays a Role

A bright spot for rural areas are those places with high natural amenities — a catch-all term used to describe various aspects of the natural environment. Many studies have confirmed the importance of amenity-driven migration to rural places. Those communities with scenic vistas and recreational opportunities tend to fare better with population growth than other rural communities, all else equal.

But are there strategies that rural places without desirable climates or scenic vistas can pursue? Schools and workforce development is one such strategy area for rural communities to consider. The high school reunion study found that returnees thought highly of their local public schools. Research at the Richmond Fed and the U.S. Department of Agriculture by Anil Rupasingha and me confirmed this pattern. In a 2020 article in the *Journal of Regional Science*, we used test score and high school dropout data and found that increases in public school quality increased the number of new residents moving in to rural counties, even after taking into account natural amenities in the area.

Moreover, the effect of schools doesn't end at K-12: Community colleges and vocational colleges can also play an important role. In their 2009 book *Hollowing Out the Middle: The Rural Brain Drain and What It Means for America*, sociologists Patrick Carr and Maria Kefalas argued that a better linkage between high school students with vocational training and local jobs would help compensate for the loss of college-bound rural youth. The idea has appeal in that it would at least partially counteract the sense that some rural youth have that there is no opportunity in their hometowns.

Garrett County, in the western part of Maryland, is an example of a place that is trying to accomplish just that. The county established a scholarship program for all resident high school graduates to cover any remaining cost of tuition and fees at the local community college — Garrett College — after taking into account all other grants

Garrett County in western Maryland has established a scholarship program that helps resident high school students with tuition and fees for Garrett College, the local community college.

IMAGE: BOB CARNEY PHOTOGRAPHY

and scholarships. Since then, the program has been expanded to cover noncredit certificate programs and dual enrollment students. In West Virginia, the PROMISE Scholarship Program gives merit-based aid to residents of West Virginia who attend an in-state college or university. Whether at the county or state level, these types of scholarships can encourage young people to stay for their education and increase the likelihood that they will put down roots in the region.

> Reversing the population decline for rural communities will require working on reducing out-migration and increasing in-migration.

What Does the Future Hold?

Early signs suggest that the population loss experienced in rural America over the 2010s has abated. A 2019 report by John Cromartie and Dennis Vilorio of the U.S. Department of Agriculture's Economic Research Service showed the rural population decline that started in 2010 eventually turned around and ended with an increase of 33,000 people between 2016 and 2017, driven by a slight increase in migration from urban to rural communities. An improving economy helped some rural areas succeed in drawing in more people. But the problem of population loss will likely remain for many rural communities. Cromartie and Vilorio also noted that despite the gains some rural areas have made recently, many rural counties actually experienced declines in net migration. They were mostly in "low-density, remote areas in the Nation's Heartland, in Appalachia from Eastern Kentucky to Maine, and in high-poverty areas in the Southeast and border areas of the Southwest."

While regional conditions vary, the strategies outlined above can help rural communities attract new residents. The economic forces incentivizing out-migration to urban areas will remain, but for reasons that are not fully understood, Americans are moving less frequently than they did historically. It remains to be seen if the trend toward staying in place will help stem the tide for many rural communities. Another potential factor at play is the expansion of broadband in rural areas. If access to broadband is made available to rural communities, opportunities for remote work and increased access to critical educational and health services may tip the scale in many peoples' minds to move to the country. **EF**

Our Related Research

"Understanding Geographic Inequality," *Econ Focus*, Fourth Quarter 2019

"In Tourism, Old Stories and New Opportunities," *Econ Focus*, Fourth Quarter 2019

"Community Colleges in the Fifth District: Who Attends,Who Pays?" *Econ Focus*, Fourth Quarter 2019

"The Young Adult Homeownership Gap: Evidence from Fifth District HMDA Data," Regional Matters, Nov. 7, 2019

"On Regional Borrowing, Default, and Migration," Working Paper No. 19-04, February 2019

"Rural Hospital Closures and the Fifth District," *Econ Focus*, First Quarter 2019

"Connecting Rural Households to Broadband: Barriers and Models for Public Intervention," 5th District Spotlight, Issue 1, 2019

"Definitions Matter: The Rural-Urban Dichotomy," *Econ Focus*, Third Quarter 2018

INTRODUCING…

THE CFO SURVEY

A collaboration between Duke University's Fuqua School of Business and the Federal Reserve Banks of Richmond and Atlanta

For almost 25 years, the Duke CFO Global Business Outlook has provided policymakers, academics, and the public with an understanding of how financial executives view the economy and prospects for their business. On May 15, three partners — Duke University's Fuqua School of Business, the Federal Reserve Bank of Richmond, and the Federal Reserve Bank of Atlanta — announced an enhanced continuation of this survey, now called The CFO Survey.

The new CFO Survey will offer the same critical information on the economic outlook, and, through some methodological updates, an enhanced look at how U.S. companies are perceiving and reacting to the current economic environment.

The first set of data generated using the updated questionnaire design will be available on July 8 on the new CFO Survey website: www.cfosurvey.org.

Opinion

Making Up Is Hard to Do

BY JOHN WEINBERG

Since March, discussions of the economy and Federal Reserve policy have been dominated by the effects of the COVID-19 pandemic. But it is worth remembering that starting last year and continuing into the beginning of this year, the Fed had been conducting a broad review of the strategy, tools, and communications practices it uses to pursue its dual mandate of maximum employment and price stability. That review was taking place at a remarkable moment in the history of U.S. monetary policy. When I arrived as a research economist nearly 30 years ago, the Fed had not yet completed its historic conquest of the Great Inflation. The ultimate success of that long campaign firmly established the institution's anti-inflationary credentials — so much so that, by now, it has become widely perceived that the Fed faces an altogether different challenge.

One of the greatest concerns for policymakers in recent years has been the strong tendency for the Fed to undershoot its 2 percent inflation target, which it introduced in January 2012. Since then, the Fed's preferred inflation measure, based on the core personal consumption price index, has ranged between 1.2 percent and 2.1 percent. These asymmetric outcomes relative to the 2 percent target have occurred despite repeated Fed statements that its target is symmetric — meaning it is equally concerned about overshooting or undershooting the target. Policymakers have worried that the persistent undershooting will further solidify expectations of low inflation and encourage households and businesses to behave in ways that reinforce those expectations and may in fact cause inflation to drift even lower.

A major worry is that persistently low inflation expectations, coupled with low interest rates, may hamper the Fed's ability to conduct countercyclical monetary policy. In particular, secularly low interest rates can limit the Fed's room to cut the federal funds rate before hitting the rate's lower bound, which is generally believed to be around zero. The current crisis is a case in point, as the Fed quickly took interest rate policy to the lower bound with successive federal funds rate cuts in early and mid-March. In fact, the Fed went further, introducing new rounds of quantitative easing and opening a range of special credit facilities. An assessment of the Fed's response to the crisis is an important topic — but it's one for another day.

Most economic models tell us that changing expectations can do a lot of the work toward changing actual inflation outcomes. Consequently, there appears to be a lot of agreement on the need to nudge inflation expectations upward to the point where market participants believe that inflation is just as likely to overshoot as undershoot the 2 percent target.

One prominent idea that has been under consideration by Fed policymakers is some sort of "makeup" rule whereby an intermediate-range inflation target would be set higher than the long-term 2 percent target after periods when realized inflation has been lower than 2 percent (and vice versa). In this way, the makeup policy would attempt to produce inflation outcomes that, over the long haul, are symmetrical around the long-term 2 percent target.

Any makeup policy should take into account some important guiding principles. One is that policy actions should be visibly consistent with policy goals. Another is that policy rules need to be credible. For instance, it may be problematic to specify an intermediate-range inflation target according to a strict historical average because such a formula may dictate policy actions that policymakers are ultimately unwilling or unable to implement. Following a sustained period of recession and zero inflation, for example, the amount of inflation needed to achieve the 2 percent average in a reasonable time frame may strain credulity. Consequently, rather than employing a strict formula, a central bank that targets average inflation may prefer an approach that preserves flexibility, such as general statements like "policy will attempt to achieve inflation outcomes that compensate for past misses."

But history has shown that it has often been difficult to change inflation expectations, at least in the desired direction. For example, the victory over the Great inflation — initiated by Fed Chair Paul Volcker in the late 1970s — did not come easy. A cogent analysis of the battle was provided by the late Marvin Goodfriend, my former colleague who left a big imprint on the Richmond Fed and the economics of central banking more generally. According to his account, the Fed was able to successfully subdue inflation expectations only after aggressively responding to recurring "inflations scares" with interest rate hikes on multiple occasions over an extended period of time.

And little comfort is provided by Japan's efforts to increase inflationary expectations. The Bank of Japan's long-standing policy of low interest rates and its more recent program of substantial quantitative easing, while they may have raised inflation some, have failed to achieve the stated goals.

The process of guiding inflation expectations higher is not likely to be easy. Indeed, the historical record suggests that making up for periods of below-target inflation will be challenging. **EF**

John A. Weinberg is a policy advisor at the Federal Reserve Bank of Richmond.

Next Issue

Fed Lending Programs

In response to the COVID-19 crisis, the Fed has created new programs to lend to banks, businesses, and state and local governments. The Fed used its emergency authority granted by Section 13(3) of the Federal Reserve Act, which authorizes the Fed to lend to entities other than banks in "unusual and exigent circumstances." Some of the programs were modeled after ones created during the financial crisis of 2007-2008. How have lessons learned from past downturns shaped how the Fed lends in a crisis?

Rural Broadband

For years, many rural communities have lagged behind cities in access to affordable, fast broadband internet connections. The COVID-19 outbreak made the need for high-speed internet even more apparent, with many households working from home and relying on video conferencing to stay in touch with teachers, doctors, and loved ones. Despite this growing need, affordable broadband remains elusive for many communities. What barriers remain to improving rural connections?

Making Columbia, Md., and Reston, Va.

Two of the early highly planned towns of the mid-1960s were Columbia, Md., founded by James Rouse, and Reston, Va., founded by Robert E. Simon Jr. Both towns were designed as expressions of their founder's visions of an economically and racially integrated alternative to conventional suburban and urban living. But large-scale innovation in real estate development didn't come easily.

Interview

Joshua Gans of the University of Toronto's Rotman School of Management on the economics of the coronavirus, the economics of AI, and applying economics to parenthood.

Federal Reserve Bank
of Richmond
P.O. Box 27622
Richmond, VA 23261
Change Service Requested

To subscribe or make subscription changes, please email us at research.publications@rich.frb.org or call 800-322-0565.

Regional Matters

Regional Matters is an economics blog from the Richmond Fed's Research Department. It focuses on local, regional, and national data that matter to the Fifth District's economy and communities.

Recent posts include:

- Rural Health Care Access in the Fifth District by Surekha Carpenter and Tim Sablik
- Under Pressure: Small-Business Lenders and COVID-19 by Emily Wavering Corcoran
- Unemployment Insurance Programs and the Roles of the States by Ann Macheras
- The COVID-19 Pandemic and the Fifth District Economy by Sonya Ravindranath Waddell and Jacob Crouse

Visit: https://www.richmondfed.org/research/regional_economy/regional_matters