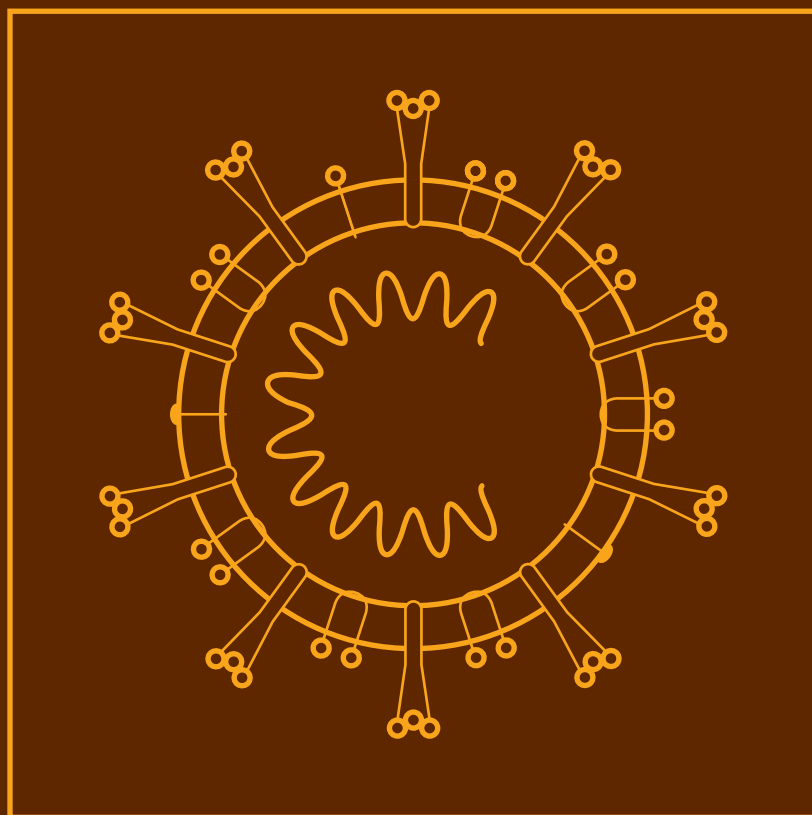


Economic Insights

Third Quarter 2020
Volume 5, Issue 3



Third District State
Budgets in the
Coronavirus Recession

Tracking U.S. Real
GDP Growth During
the Pandemic

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in the Third District
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Banking Trends

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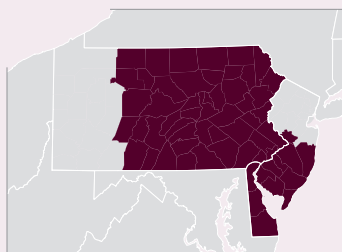
Economic Insights

A publication of the Research Department of the Federal Reserve Bank of Philadelphia

Economic Insights features nontechnical articles on monetary policy, banking, and national, regional, and international economics, all written for a wide audience.

The views expressed by the authors are not necessarily those of the Federal Reserve.

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COVID-19


This issue's cover depicts a cellular model of SARS-CoV-2, the coronavirus responsible for the respiratory disease COVID-19. In just a few months, COVID-19 has become a pandemic. In this special issue of *Economic Insights*, we explore some of the economic implications of this new and deadly disease.



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Third District State Budgets in the Coronavirus Recession

Delaware, New Jersey, and Pennsylvania are in for a struggle as they try to balance their budgets during this unprecedented economic cycle.

BY ADAM SCAVETTE

State and local governments across the United States are bracing for financial hardships due to the coronavirus pandemic. As the nation endures the extended economic impact of the pandemic, including the various mandated shutdowns of nonessential businesses, now is a good time to understand the basics of state budgets as well as how they change over the business cycle. In addition to exploring the effects of the anticipated recession on state budgets and the federal government's efforts to aid the states, this article examines the expected nuances of this recession. It then takes a specific look at the Third Federal Reserve District states (Delaware, New Jersey, and Pennsylvania) to assess their preparedness to weather this economic downturn.

Fundamentals of State Budgets

As we witness the responses of individual states to the coronavirus, with daily updates from governors and state public health commissioners, it is apparent that state governments are vital components of the nation's public sector. Indeed, when defense spending is not counted, state and local governments have historically undertaken more spending on public goods and services than has the federal government.¹ In 2018, total federal expenditures, excluding defense spending and grants to state and local government, was \$3.2 trillion, whereas total state and local expenditures was \$3 trillion (15.6 percent and 14.6 percent of gross domestic product, respectively) (Figure 1).² State expenditures support education, infrastructure,

FIGURE 1

Total Expenditures

Excluding defense and intergovernmental transfers (2018)

Federal

3.2 tn

15.6% of GDP

State and Local

3.0 tn

14.6% of GDP

Source: U.S. Bureau of Economic Analysis; author's calculations.

health, hospitals, and public welfare (for example, Medicaid), among other items. State governments fund these expenditures with intergovernmental revenue (that is, transfers from the federal government) and tax receipts (sales, individual income, and corporate income), among other sources (Figure 2).

When the country faces an economic downturn, revenues shrink and expenditures rise, straining state budgets from opposite directions. If many consumers lose their jobs and spend less on goods and services, states receive less revenue from income and sales taxes. Simultaneously, demand for state government services such as unemployment insurance and Medicaid increase, raising overall expenditures. When expenditures exceed revenues, state governments face a budget gap, which they must address in the near term: Unlike the federal government, most states are required to balance their budgets from year to year.³

Aside from federal aid that states may receive during national downturns, states can address budget gaps by increasing revenue (for example, by raising taxes), cutting expenditures, drawing money

from a rainy day fund, or borrowing with municipal bonds.⁴ Tax hikes and spending cuts in the face of a recession may exacerbate the downturn or delay the recovery as consumers are further strained financially and public service jobs are eliminated. Although states can draw from rainy day funds, which are special reserve funds generated from surplus budget years specifically to aid during downturns, the level of reserves that each state may have at any given time varies significantly.⁵ Lastly, if allowed by its constitution, a state may issue debt in order to balance its budget. Municipal debt is issued on bond markets and rated by independent agencies according to the assessed future solvency of the issuing state, so states pay different interest rates for the money they borrow.⁶

Despite the \$144 billion in fiscal relief funds to state and local governments from the American Recovery and Reinvestment Act of 2009,⁷ many states addressed their remaining budget gaps with tax increases and cuts in government services. In the three fiscal years following the start of the recession (2009–2011), 40 states enacted tax or fee hikes, 34 reduced spending on K-12 education, 43 reduced spending on college education, 31 reduced health care spending, and 29 reduced expenditures for services to the elderly and disabled (Figure 3).⁸ The effect of these state spending cuts is perhaps most clear in state government employment numbers in the immediate recovery years.⁹ From January 2009 through January 2013, state governments collectively shed 177,000 jobs (a 3.4 percent drop), and even as of February 2020, state government employment had not recovered to its peak level (Figure 4).¹⁰

What Happened Last Time

During the Great Recession of 2008–2009 and the subsequent recovery, nearly every state in the nation faced a budget gap as respective state revenues declined and expenditures increased (mostly driven by increased enrollments in Medicaid).

What Makes the Coronavirus Recession Different

While other recessions in the past few decades have forced states to reckon with budget crises solely due to the effects of

FIGURE 2

State Revenue Suffers During Recessions

Model State Revenue



How States Fund Government Expenditures

During a recession, **1** services like unemployment insurance and Medicaid raise expenditures while **2** revenues shrink as people spend less and lose their jobs and income. Budget gaps **3** emerge when expenditures exceed revenues.

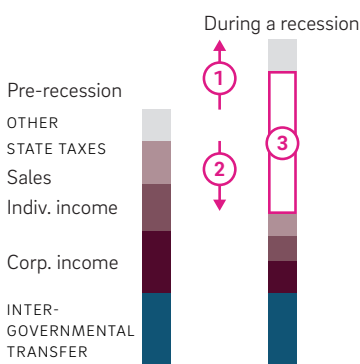
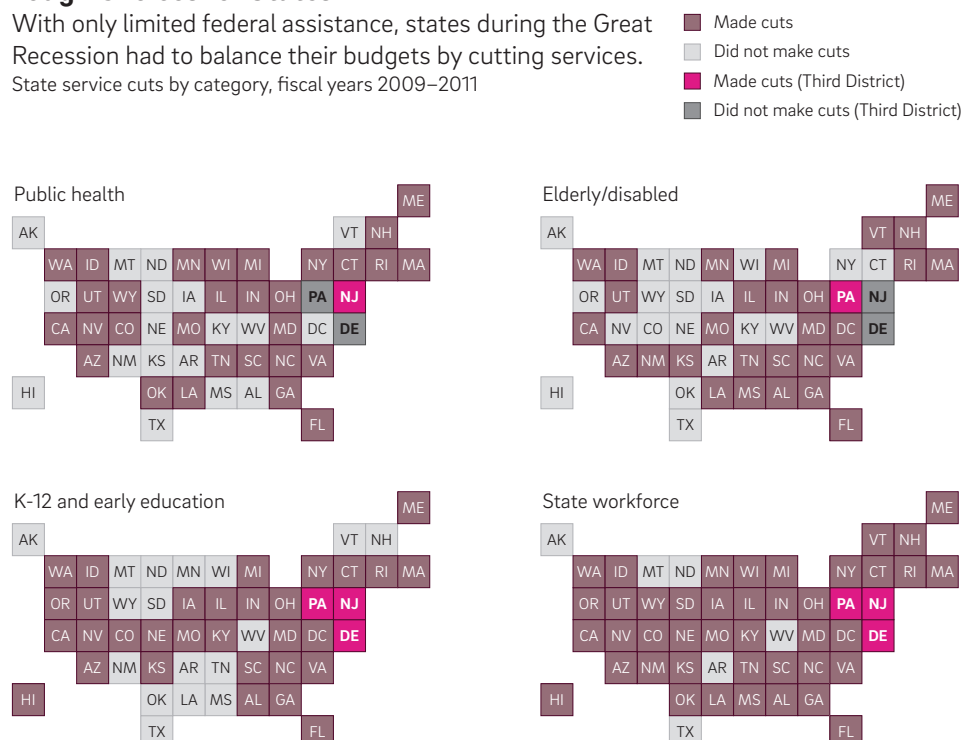


FIGURE 3

Tough Choices for States

With only limited federal assistance, states during the Great Recession had to balance their budgets by cutting services. State service cuts by category, fiscal years 2009–2011



Source: Johnson, Oliff, and Williams (2011).

a slowing economy, the coronavirus recession will also force states to fund the battle against the virus (for example, through hospitals, healthcare, infrastructure, and police). This means that expenditures will increase far more than during previous recessions, especially for states particularly hard hit by the coronavirus in terms of hospitalizations and deaths, such as New Jersey and New York.¹¹

Beyond the health-related costs of the virus, we can identify areas that are more likely to suffer during recessions based on their industry mix.¹² A recent analysis by Moody's has identified the most at-risk industries for this coronavirus recession: leisure and hospitality,¹³ transportation, and employment services. Therefore, states and local areas that have a high share of employment in these industries should expect to see larger downturns than the national average, and these effects will stress public budgets.¹⁴

Although leisure and hospitality represents 11 percent of national employment,¹⁵ the number of jobs in the industry is up 40 percent since the end of the 2001 recession,¹⁶ whereas overall employment has grown less than 20 percent (Figure 5). Because restaurants, the arts, and entertainment venues are typically enjoyed in person, we can expect the coronavirus recession to have a harsh effect on this economic sector. The pandemic's lingering effect on future consumer demand for hospitality services is uncertain, and is

perhaps only comparable to the impact on the airline and travel industry after the 9/11 terrorist attacks.¹⁷ The attacks resulted in a 32 percent annual reduction in air travel in September 2001 and a 12 percent reduction the following year, most likely because consumers continued to avoid flying. How badly will the pandemic affect the hospitality industry? A clue comes from an early April 2020 survey by the National Restaurant Association, which found that, even in the midst of federal government assistance, "15 percent of U.S. restaurants have permanently closed or are likely to in the next two weeks."¹⁸

How the Federal Government Aids States

Although the federal government has spent trillions of dollars trying to stabilize the economy, it has imposed limits on how state and local governments may use this money. Notably, the \$2 trillion Coronavirus Aid, Relief, and Economic Security (CARES) Act, which Congress enacted in late March 2020, included, in addition to direct aid to American workers and assistance for small businesses via the Paycheck Protection Program,¹⁹ a \$150 billion Coronavirus Relief Fund for payments to state and local governments.²⁰ However, this relief fund is to be used only for expenditures related to the public health emergency, and it cannot be used to cover expenditures that were already accounted for in

state budgets before the date of the act's passage (March 27, 2020). Although the fund will aid in covering unforeseen expenditures related to the coronavirus over the remainder of 2020, it cannot directly²¹ cover the revenue shortfalls and expenditure increases resulting from slowing state economies due to the mandated shutdowns.²² (To address this limitation, in early April 2020 the Federal Reserve, under credit protection from the Department of the Treasury, instituted the Municipal Liquidity Facility [MLF] to buy up to \$500 billion in short-term debt directly from state and local governments.²³)

Fiscal Preparedness Among Third District States

In order to analyze the preparedness of the Third District states to weather the budget gaps that they are certain to incur in this fiscal year and perhaps beyond, we examine their rainy day funds, their credit ratings, and results from a budget stress test used to analyze the effects of the coronavirus on respective state public finances.

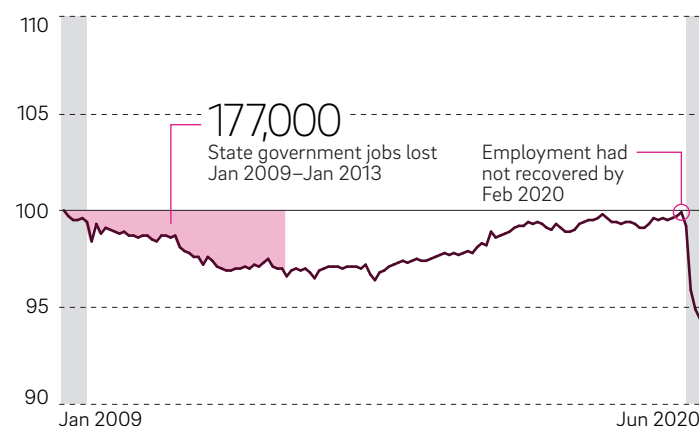
State rainy day funds may be inadequate for this downturn. A recent Tax Foundation Analysis found that the median rainy day fund balance was 8 percent of state general fund expenditures, whereas it is recommended that states carry 15 percent in order to withstand revenue shortfalls associated with a moderate recession.²⁴ At the start of fiscal year 2020,

FIGURE 4

Budget Cuts Led to Job Cuts

As states slashed their budgets during the Great Recession, state government employment dropped.

Change in state government employment, 2009–2020; January 2009 = 100



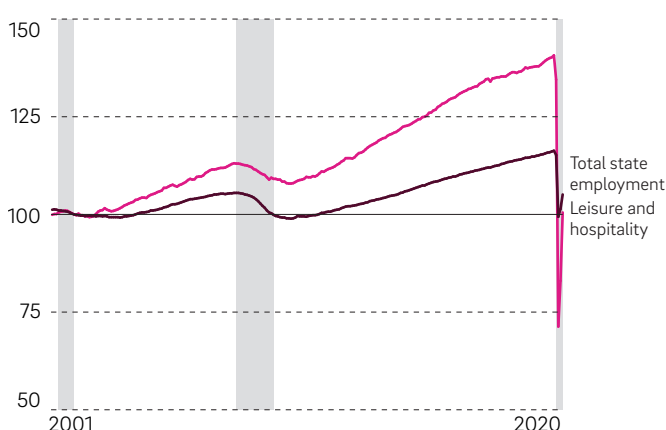
Source: U.S. Bureau of Labor Statistics (2020).

FIGURE 5

Leisure and Hospitality Stands Out

The leisure and hospitality sector has grown markedly since the 2001 recession but is suffering disproportionately now.

Sectoral change in employment, 2001–2020; 2001 = 100



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

all Third District state rainy day funds were below the median. Although Delaware's rainy day fund stood at 5.4 percent of state general fund expenditures, Pennsylvania and New Jersey tied, at 1 percent, for the lowest nondepleted funds in the country (Figure 6).²⁵

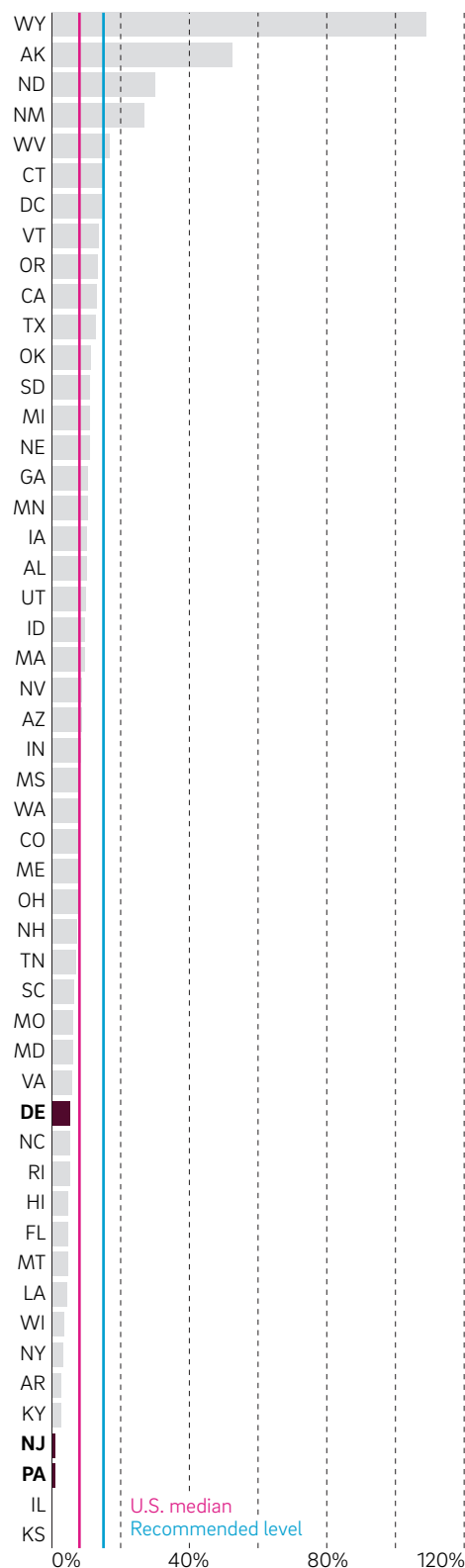
Another means of short-term funding relief for some states is the issuance of debt to financial markets.²⁶ Although the MLF was established to aid state borrowing efforts by purchasing short-term debt from state governments, borrowing costs vary across states according to perceived risk.²⁷ Commonly, general obligation debt is issued through financial markets and rated by independent rating agencies (for example, Moody's, Standard & Poor's, and Fitch), which base their ratings on a state's ability to repay debt and on the state's economic health. A lower rating for general obligation debt results in a higher interest rate for a state, which raises the cost of borrowing and ultimately results in a higher burden for that state's taxpayers. As of June 2020 (Figure 7), Delaware had an AAA rating and was one of several states that paid the lowest borrowing costs for municipal debt issuers in the nation. Pennsylvania had an A+ rating, forcing it to pay 0.5 percentage point more than states like Delaware for interest on 10-year debt. New Jersey stood among the worst-rated municipal borrowers in the nation with an A- rating, forcing it to pay 0.9 percentage point more than AAA municipal borrowers.

When Moody's Analytics ran its stress-test model in April,²⁸ it found that the coronavirus shock will have widely disparate effects on state public finances, due to states' varying levels of fiscal preparedness, employment industry mix, and tax revenue streams.²⁹ The analysis resulted in an estimated tax revenue shortfall through fiscal year 2021 of 5.6 percent for Pennsylvania, 10.6 percent for Delaware, and 25.4 percent for New Jersey (Figure 8).³⁰ According to the model, Pennsylvania's tax revenues appear to be more resilient than in most states, largely due to its heavy concentration of employment in education and healthcare.³¹ However, due to New Jersey's reliance on two volatile revenue streams—a progressive

FIGURE 6

State Rainy Day Funds May Be Inadequate for This Downturn

Rainy day fund as percentage of state general fund expenditures, start of FY 2020

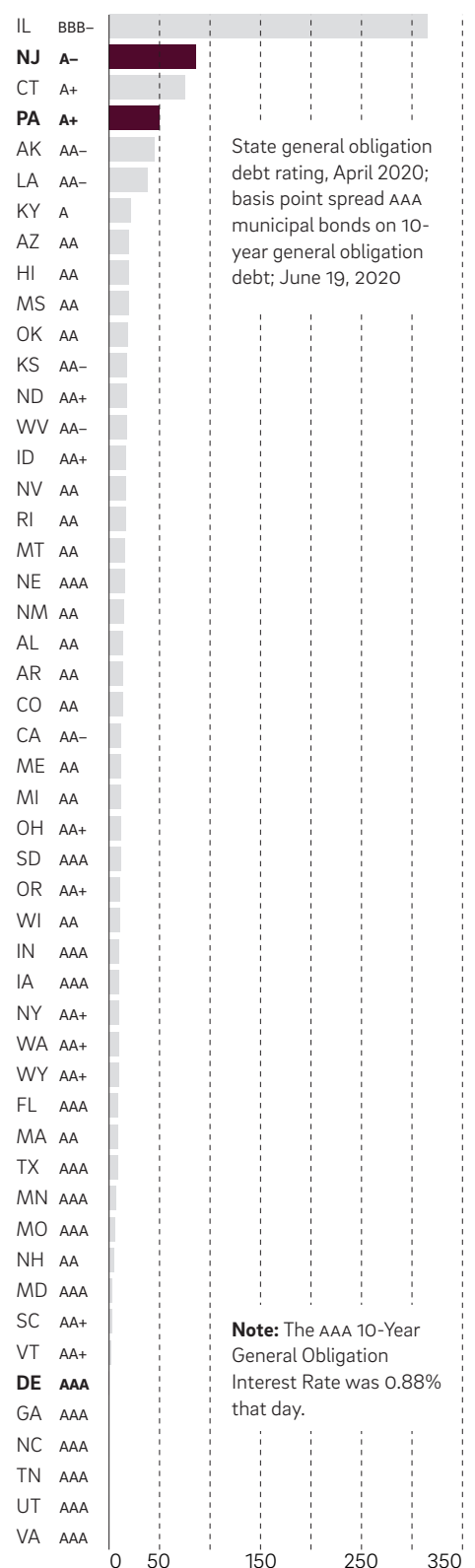


Source: Walczak and Cammenga (2020).

FIGURE 7

Borrowing Costs Vary Across States According to Perceived Risk

A lower rating generally means a higher interest rate for the state.

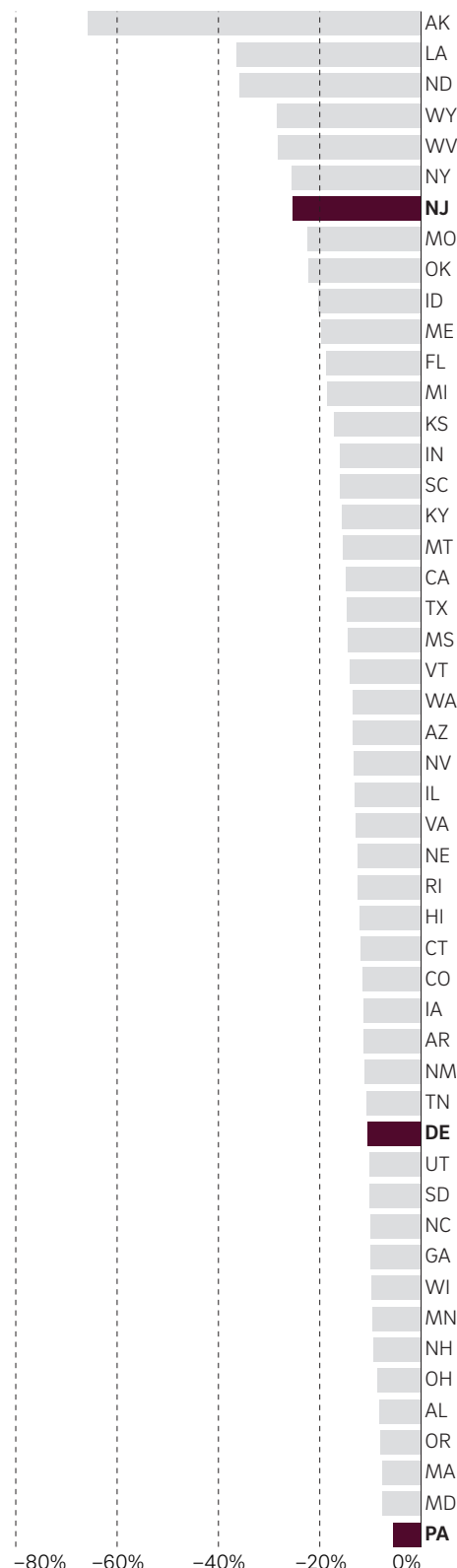


Source: Thomson Reuters Municipal Market Monitor.

FIGURE 8

COVID-19 Will Have Disparate Impact on State Finances

Estimated tax revenue shortfall, percent of 2019 general fund revenues, by state, FY 2021




Source: White et al. (2020).

personal income tax and a large employment base in hospitality and tourism—the state’s tax revenues stand to be among the worst affected.

In many states, the coronavirus recession will likely exacerbate one particular ongoing fiscal concern: the management of pension and health benefit funds for retired state workers and teachers. When crafting their annual budgets, states may defer payments into these funds in order to balance their budgets, inflating unfunded pension liabilities over time. Due in part to these deferrals, New Jersey and Pennsylvania³² have both seen their unfunded pension liabilities balloon since the Great Recession, with the former’s pension outlook ranking³³ among the worst in the country. Perceived fiscal irresponsibility reflected by large unfunded pension liabilities in Democratic-controlled states such as New York, New Jersey, and Illinois has resulted in a politicized public debate over whether any further federal aid to states to alleviate the fiscal shock of the coronavirus³⁴ would be a “blue state bailout.”

Final Thoughts

State governments will undoubtedly face difficult times as the coronavirus recession concludes and recovery begins. These governments will need to make tough decisions to address budget gaps resulting from tax revenue shortfalls and expenditure increases. We must understand the dynamics of state government budgets and the role of state government services in communities across the nation if we are to evaluate how the federal government might best address states’ needs through further legislation. Although states and municipalities around the country are preemptively addressing these budget concerns by cutting expenditures, these cuts and reduced service levels may persist for years beyond this current crisis, as occurred during the last business cycle. Moreover, state fiscal austerity in the wake of the Great Recession is estimated to have worsened the effects of the recession and slowed our nation’s last recovery considerably, making it a reaction worth avoiding.³⁵ 

How Will States Pass Their Fiscal Stress to Local Governments?

Local governments will face their own fiscal hurdles as they wade through a recession and lean on heavily distressed state governments for relief. Local governments receive 32 percent of their revenues from state transfers,³⁶ so they are particularly vulnerable to state expenditure cuts as states pass through their fiscal stress. Furthermore, aside from the largest jurisdictions, local governments must rely on states to pass on federal aid associated with the coronavirus-fighting efforts. The CARES Act, which allocates \$150 billion for state and local governments, directly allocates local funds only for jurisdictions with 500,000 or more residents, with the rest allocated to the states to relieve smaller jurisdictions. Furthermore, the Federal Reserve’s MLF will directly buy municipal debt only from counties with a population of at least 500,000 and cities with a population of at least 250,000, leaving most jurisdictions without direct access to short-term funding relief.³⁷ Unlike states facing fiscal strains, local governments may file for Chapter 9 bankruptcy protection under federal law, as Detroit did in 2013. However, governing state law must permit municipal governments to file for bankruptcy protection in order for them to do so.³⁸ In part because only about half of the states authorize municipal governments to file for bankruptcy, local governments have rarely succeeded in declaring bankruptcy over the past 20 years.³⁹

Notes

1 See Gordon (March 2012).

2 Sources: Bureau of Economic Analysis National Income and Product Account Tables 1.1.5, 3.2, 3.3, and 3.15.5; author's calculations. "Federal spending" includes Medicare and Social Security but not matches on Medicaid, as those are included in "grants to state and local government."

3 The National Conference of State Legislatures (NCSL) reports that 49 states must balance their budget, with Vermont being the exception. The requirement that a state balance its budget is either explicitly stated in the state constitution, interpreted from the state constitution, or effectively enforced due to political culture. For more information, see National Conference of State Legislatures (2010).

4 States may also use less traditional one-off actions, such as deferring pension obligations, diverting funds from an unemployment insurance trust fund, or extending the fiscal year, as New Jersey announced its intention to do for the 2020 fiscal year.

5 See Cammenga (2020).

6 By law, four states (Arizona, Colorado, Indiana, and Nebraska) prohibit debt and 12 others require voter approval of debt supported by general tax revenue. See McNichol et al. (2020).

7 Most of these funds were allocated to Medicaid and education funds. For more information, see Economic Policy Institute (2009).

8 See Gordon (July 2012).

9 See Pome and Saxon (2019).

10 U.S. Bureau of Labor Statistics, All Employees, State Government [CES9092000001], retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/CES9092000001>, April 22, 2020.

11 See *New York Times* (2020).

12 See Scavette (2019).

13 This includes NAICS sectors 71 (arts, entertainment, and recreation) and 72 (accommodation and food services).

14 A recent analysis by Brookings identified three metro areas in the Third District (Atlantic City–Hammononton, NJ; Ocean City, NJ; and East Stroudsburg, PA) among the top 15 metro areas with the largest share of high-risk employees. For more information, see Muro et al. (2020).

15 As of February 2020. For more information, see U.S. Bureau of Labor Statistics (2020).

16 See <https://fred.stlouisfed.org/series/USLAH>.

17 See Clark et al. (2009).

18 See Gangitano (2020).

19 The Paycheck Protection Program (PPP) indirectly benefits state finances: If businesses that take these forgivable loans keep employees on their payrolls, and if those employees would otherwise have been laid off, the states will save money on unemployment insurance (UI) benefits. Furthermore, the five states that do not tax UI benefits (two of which are Pennsylvania and New Jersey) will see an even larger positive fiscal effect, because, in addition to spending less on UI benefits, they will receive income taxes from those otherwise-laid-off employees—taxes paid out of the PPP funds used as wages. For more information on which states tax unemployment benefits, see Bishop-Henchman and Saddock (2013).

20 See U.S. Department of the Treasury (2020).

21 Walczak (2020) notes that "much of the funding already provided under the CARES Act, while not directly available to backfill revenue losses, is nonetheless fairly fungible, freeing up states' existing revenues to meet other needs."

22 Furthermore, a follow-up bill to CARES, the Paycheck Protection Program and Health Care Enhancement Act, passed in late April 2020, did not include aid to state and local governments. For more information, see U.S. Congress (2020).

23 See Board of Governors of the Federal Reserve System (2020).

24 See Walczak and Cammenga (2020).

25 Illinois and Kansas had nearly empty reserve funds.

26 See footnote 6 for limits on state-level debt financing.

27 In order to prevent outbidding regular investors, the Federal Reserve's MLF will charge penalty rates to borrowers tapping the facility. The penalty rates charged on individual debt are scaled based on ratings from nationally recognized statistical rating organizations (NRSROs). For more information, see Federal Reserve Bank of New York (2020).

28 See White et al. (2020).

29 Run in early April 2020, the Moody's model assumes a deep recession in the first half of 2020, with a peak unemployment rate of 13 percent in the second quarter of 2020, and a peak-to-trough real gross domestic product decline of 10 percent.

30 This does not take into consideration anticipated additional Medicaid expenditures, which increase during recessionary periods.

31 Although both of these industries have been less sensitive to recessions, this pandemic may affect them more than did previous recessions. The cancellation of elective surgeries and the associated coronavirus costs have led to widespread stress among U.S. hospitals. Furthermore, the higher-education sector is likely to struggle due to reduced enrollment, reduced state aid, and declines in endowment investments. For more information, see Hook and Kuchler (2020) and Foroohar (2020).

32 The Public Pension Management and Asset Investment Review noted that Pennsylvania's "unfunded pension liability was the direct and foreseeable consequence of past policy decisions, primarily deferring actuarially determined contributions as well as investment under-performance." For more information, see Public Pension Management and Asset Investment Review (2018).

33 See Marcus (2020).

34 See Walsh (2020).

35 See Matthews (2020).

36 See Tax Policy Center (2020).

37 State governments may now authorize at least two cities or counties eligible to directly issue notes to the MLF regardless of population. Initially, the act restricted direct aid to counties with a population of at least 2 million and cities with a population of at least 1 million.

38 See Maciag (2013).

39 See Murphy and Cook (2018).

References

Bishop-Henchman, Joseph, and Chris Saddock. "State Taxation of Unemployment Benefits," Tax Foundation, May 13, 2013. <https://taxfoundation.org/state-taxation-unemployment-benefits/>.

Board of Governors of the Federal Reserve System. "Federal Reserve Takes Additional Actions to Provide up to \$2.3 trillion in Loans to Support the Economy," April 9, 2020. <https://www.federalreserve.gov/newsevents/pressreleases/monetary20200409a.htm>.

Cammenga, Janelle. "How Healthy Is Your State's Rainy Day Fund?" Tax Foundation, April 1, 2020. <https://taxfoundation.org/2020-state-rainy-day-funds/>.

Clark, David E., James M. McGibany, and Adam Myers, "The Effects of 9/11 on the Airline Travel Industry." In Matthew Morgan, ed., *The Impact of 9/11 on Business and Economics*. New York: Palgrave Macmillan, 2009, pp. 75–86. https://link.springer.com/chapter/10.1057/9780230100060_7.

Economic Policy Institute. "Fiscal Relief for State and Local Governments: American Jobs Plan," November 24, 2009. https://www.epi.org/publication/relief_for_state_and_local_gov/.

Federal Reserve Bank of New York. "FAQs: Municipal Liquidity Facility," May 15, 2020. <https://www.newyorkfed.org/markets/municipal-liquidity-facility/municipal-liquidity-facility-faq>.

Foroohar, Rana. "Coronavirus Bursts the U.S. College Education Bubble," *Financial Times*, April 26, 2020. <https://www.ft.com/content/e5d50e86-861a-11ea-b872-8db45d5f6714>.

Gangitano, Alex. "Restaurant Industry Calls for Changes to Small-Business Loan Program," *The Hill*, April 9, 2020. <https://thehill.com/business-a-lobbying/business-a-lobbying/492031-restaurant-industry-calls-for-changes-to-small>.

Gordon, Tracy. "What States Can, and Can't, Teach the Federal Government About Budgets," Brookings Institution Report (March 2012). <https://www.brookings.edu/research/what-states-can-and-cant-teach-the-federal-government-about-budgets/>.

Gordon, Tracy. "State and Local Budgets and the Great Recession," Stanford Center on Poverty and Inequality Report (July 2012). https://web.stanford.edu/group/recessiontrends-dev/cgi-bin/web/sites/all/themes/barron/pdf/StateBudgets_fact_sheet.pdf.

Hook, Leslie, and Hannah Kuchler. "How Coronavirus Broke America's Healthcare System," *Financial Times*, April 30, 2020. <https://www.ft.com/content/3bbb4f7c-890e-11ea-a01c-a28a3e3fbd33>.

Johnson, Nicholas, Phil Oliff, and Erica Williams. "At Least 46 States Have Imposed Cuts That Hurt Vulnerable Residents and Cause Job Loss," Center on Budget and Policy Priorities Report, February 9, 2011. <https://www.cbpp.org/sites/default/files/atoms/files/3-13-08sfp.pdf>.

Maciag, Michael. "Municipal Bankruptcy State Laws Policy Map," *Governing*, January 25, 2013. <https://www.governing.com/gov-data/state-municipal-bankruptcy-laws-policies-map.html>.

Marcus, Samantha. "N.J.'s Troubled Public Worker Pension Fund Piled Up More Debt Before Coronavirus Crisis," *NJ.com*, May 12, 2020. <https://www.nj.com/politics/2020/05/njs-troubled-public-pension-fund-piled-up-more-debt-before-coronavirus-crisis.html>.

Matthews, Dylan. "The Case for a Massive Federal Aid Package for States and Cities," *Vox*, April 22, 2020. <https://www.vox.com/policy-and-politics/2020/4/22/21228229/coronavirus-bailout-money-state-austerity-budget-shortfall>.

McNichol, Elizabeth, Michael Leachman, and Joshuah Marshall. "States Need Significantly More Fiscal Relief to Slow the Emerging Deep Recession," Center on Budget and Policy Priorities Report, April 14, 2020. <https://www.cbpp.org/research/state-budget-and-tax/states-need-significantly-more-fiscal-relief-to-slow-the-emerging-deep>.

Muro, Mark, Robert Maxim, and Jacob Whiton. "The Places a COVID-19 Recession Will Likely Hit Hardest," Brookings Institution, March 17, 2020. <https://www.brookings.edu/blog/the-avenue/2020/03/17/the-places-a-covid-19-recession-will-likely-hit-hardest/>.

Murphy, Mary, and Matthew Cook. "Local Governments Rarely File for Bankruptcy," Pew Charitable Trusts Fact Sheet, February 6, 2018. <https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2018/02/local-governments-rarely-file-for-bankruptcy>.

National Conference of State Legislatures. "NCSL Fiscal Brief: State Balanced Budget Provisions" (October 2010). <https://www.ncsl.org/research/fiscal-policy/state-balanced-budget-requirements-provisions-and.aspx>.

New York Times. "Coronavirus in the U.S.: Latest Map and Case Count," accessed May 7, 2020. <https://www.nytimes.com/interactive/2020/us/coronavirus-us-cases.html>.

Pome, Edwin, and Nicholas Saxon. "Effects of Economic Downturn on Private and Public Employment," U.S. Census, October 17, 2019. <https://www.census.gov/library/stories/2019/10/effects-of-economic-downturn-private-and-public-employment.html>.

Public Pension Management and Asset Investment Review Commission. "Final Report and Recommendations," *Treasury Department: Commonwealth of Pennsylvania*, December 2018. <https://www.psers.pa.gov/About/Investment/Documents/PPMAIRC%202018/2018-PPMAIRC-FINAL.pdf>.

Scavette, Adam. "Regional Spotlight: Evaluating Metro Unemployment Rates Throughout the Business Cycle," Federal Reserve Bank of Philadelphia *Economic Insights* (Fourth Quarter 2019), pp. 12–18. https://www.philadelphiafed.org/-/media/research-and-data/publications/economic-insights/2019/q4/eiq419_rs-evaluating-unemployment-rates.pdf?la=en.

Tax Policy Center. *The Tax Policy Center's Briefing Book: A Citizen's Guide to the Fascinating (Though Often Complex) Elements of the U.S. Tax System*, May 2020. <https://www.taxpolicycenter.org/briefing-book/what-are-sources-revenue-local-governments>.

U.S. Bureau of Labor Statistics. Industries at a Glance: Leisure and Hospitality. Accessed May 7, 2020. <https://www.bls.gov/iag/tgs/iag70.htm>.

U.S. Congress. H.R.266—Paycheck Protection Program and Health Care Enhancement Act. 116th Congress, April 24, 2020. <https://www.congress.gov/bill/116th-congress/house-bill/266>.

U.S. Department of the Treasury. "The CARES Act Provides Assistance for State and Local Governments," accessed May 7, 2020. <https://home.treasury.gov/policy-issues/cares/state-and-local-governments>.

Walczak, Jared. "Designing a State and Local Government Relief Package," Tax Foundation, May 12, 2020. <https://taxfoundation.org/state-and-local-relief-package-coronavirus-relief-fund-cares-act/>.

Walczak, Jared, and Jannelle Cammenga. "State Rainy Day Funds and the COVID-19 Crisis," Tax Foundation, April 7, 2020. <https://taxfoundation.org/state-rainy-day-funds-covid-19/>.

Walsh, Mary Williams. "As Virus Ravages Budgets, States Cut and Borrow for Balance," *New York Times*, May 14, 2020. <https://www.nytimes.com/2020/05/14/business/virus-state-budgets.html>.

White, Dan, Sarah Crane, and Colin Seitz. "Stress-Testing States: COVID-19," Moody's Analytics Analysis, April 14, 2020. <https://www.economy.com/economicview/analysis/379097/StressTesting-States-COVID19>.

Massive Job Losses

COVID-19 has hit the labor market to an unprecedented extent.



Note: Nonfarm payroll employment, month-over-month change, seasonally adjusted, in thousands, 2010–2020

Source: Bureau of Labor Statistics.

Tracking U.S. Real GDP Growth During the Pandemic

COVID-19 has wreaked economic havoc with remarkable speed, which is why it's so important for policymakers to know what's happening to the economy in real time.

BY JONAS ARIAS AND MINCHUL SHIN

Jonas Arias is a senior economist and **Minchul Shin** is a senior machine learning economist at the Federal Reserve Bank of Philadelphia. The views expressed in this article are not necessarily those of the Federal Reserve.

COVID-19 has caused a public health and economic crisis across the globe. As scientists fervently search for an effective treatment and a vaccine, policymakers are implementing policies to dampen the economic hardship experienced by households and firms.

Such policies are more likely to succeed if their design reflects current economic conditions, but policymakers often find it difficult to learn about the economy in real time—even more so when a new and unpredictable disease has caused nearly all economic indicators to shatter long-standing records. For example, in April alone the U.S. economy lost as many jobs as had been gained during the previous decade. The labor market perked up in May and June, but it's still too soon to accurately estimate when employment will return to pre-COVID-19 levels.

Earlier this year, professional forecasters agreed that real gross domestic product (GDP) would shrink in the second quarter, but by how much? Answering this question precisely in real time is challenging, but it is feasible to produce estimates based on econometric analysis.¹

Policymakers have three types of state-of-the-art measures of current economic conditions. First, there are real-time estimates

of the pace at which real GDP is increasing or decreasing, such as the Atlanta Fed GDPNow and the New York Fed Staff Nowcast. Second, real-time business conditions indicators provide a signal of the underlying state of the economy, including the Chicago Fed National Activity Index, the Philadelphia Fed Business Conditions Index, and the recently developed New York Fed Weekly Economic Index. And third, there are survey-based estimates of current and future economic activity. Blue Chip Economic Indicators and the Survey of Professional Forecasters both have a long history of conducting and summarizing survey-based forecasts of U.S. economic growth.

Methodology

Although all three types are useful, we adopt the first approach to estimate in real time the pace at which real GDP is increasing or decreasing during the pandemic. This approach offers a simple procedure for quantifying the economic consequences of COVID-19 in real time. Indices of economic activity typically abstract from reporting estimates of real GDP growth, and surveys are generally more expensive to conduct and update in real time.

The backbone of our analysis is a traditional dynamic factor model approach.² Recent extensions of this framework deal with flows of information at different frequencies, turning sparse signals into one aggregate summary statistic at each point in time.³

Our model is similar to the one used by the Philadelphia Fed for its Aruoba-Diebold-Scotti Business Conditions Index.⁴ Accordingly, it includes data on these variables: initial jobless claims, nonfarm payroll employment, real manufacturing and trade industries sales, real personal income excluding current transfer receipts, the industrial production index, and real GDP.⁵ However, we also add raw steel production in order to take into account COVID-19's sudden effect on the production side of the economy. Although we could have incorporated other weekly economic indicators,⁶ we decided to preserve the parsimonious spirit of Aruoba, Diebold, and Scotti's original research.

Using the data and the dynamic factor model, we extract an unobserved factor characterizing the underlying state of the

economy (also known as latent business conditions), and we translate this factor into a real-time estimate of the current pace of real GDP growth. This is commonly referred to as real-time tracking of real GDP growth.⁷

Tracking Real GDP Growth During the First Quarter

Our real-time estimate for the first quarter of 2020 evolved as new information was released from January 30 through April 29. We selected these dates so that our model always provided an estimate of real GDP growth in association with the next release of the Bureau of Economic Analysis (BEA). More specifically, the BEA releases the advance estimate of real GDP in the final week of the month following the end of the quarter for which real GDP is being estimated. For example, on January 30 the BEA released the advance estimate of real GDP growth in the fourth quarter of 2019, and on April 29 it released the advance estimate of real GDP growth in the first quarter of 2020.

Figure 1 shows the evolution of our real-time estimate of real GDP growth in the first quarter of 2020. According to the model, during the first two months of

the first quarter, real GDP was increasing at a pace slightly above 2 percent—similar to the trend growth rate of many forecasters.⁸

On March 19, as the COVID-19 pandemic worsened, California issued the first stay-at-home order in the U.S., and almost all states eventually followed suit. A week later, on March 26, the Bureau of Labor Statistics (BLS) provided a first look at COVID-19's whopping economic impact when it reported that nearly 3.3 million people filed for unemployment insurance during the week ending March 21. Our model translated this bleak picture of the labor market into a 2.9 percentage point decline in the real-time estimate for the annual rate of real GDP growth in the first quarter of 2020.

The data on raw steel production released on March 30 confirmed that the decline in economic activity signaled by the labor market was also being felt across industries that rely on steel and iron as inputs. The model interpreted these data as further signaling a decline in the pace of economic activity, so the real-time estimate dropped to an annualized rate of -0.9 percent.

Three days later, the BLS reported that the number of initial jobless claims filed for the week ending March 28 had reached

See [Real-Time Tracking of Real GDP Growth and A Brief Literature Review](#).



Real-Time Tracking of Real GDP Growth

We use the term *real-time tracking of real GDP growth* to refer to economic predictions of the near past, present, or immediate future.¹³ We will also use the term to refer to the system of methods developed to generate such predictions. This methodological approach is particularly important because economic data are often released with a lag. For example, given how hard it is to summarize and combine economic information from different economic sectors, it takes roughly a month for the BEA to release the initial official estimate (known as the advance estimate) of the rate at which GDP contracted or expanded in the preceding quarter.¹⁴

Any model for tracking real GDP growth in real time is a function that inputs from the vast and continuously evolving economic data and outputs the current estimate of a variable, such as inflation or real GDP growth. In our study, the function is the small-data dynamic factor model and the inputs are the seven variables we previously described. Consider a hypothetical example in which the goal is to estimate real GDP growth during period $[t_0, t_1]$ using information from $t_0 + \Delta_0$ until $t_1 + \Delta_1$.¹⁵ As new data become available for each of the input variables at any given point during the period $[t_0 + \Delta_0, t_1 + \Delta_1]$, we feed it into a function that returns the best guess of the target variable; that is, the estimate that minimizes the expected prediction errors associated with our tracking estimates. Hence, real-time tracking of real GDP growth is a sequential process.

A Brief Literature Review

How can we improve the quality of our real-time estimate for the current level of the nation's output growth using mixed-frequency data? The Federal Reserve System has taken the lead in addressing this important question. Early examples include Corrado and Greene (1988), Trehan (1989), Fitzgerald and Miller (1989), and Zdrozny (1990). Economists use two classes of econometric models to track real GDP growth.¹⁶ The first class is called partial modeling; the second, full modeling. Partial modeling focuses on how the set of predictors affects the target variable. Full modeling characterizes a complete joint relationship among the variables under consideration.¹⁷ The former is computationally simpler and robust to a model misspecification, as it considers a minimal set of relationships among variables to generate an estimate for the target variable. However, because it does not use the full relationship among variables, the former can be less efficient than the latter.¹⁸ Economists disagree regarding which approach is consistently superior.

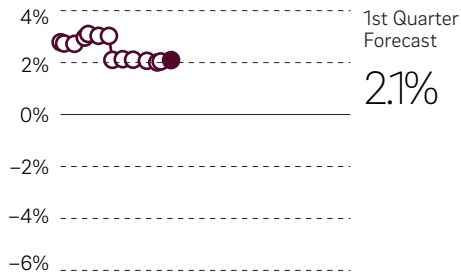
FIGURE 1

Evolution of Real-Time Estimate of Real GDP Growth in 1Q2020

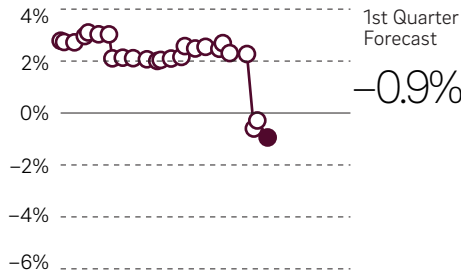
As new information became available, model's estimate approached BEA advance estimate.

Estimated percent change in GDP at an annual rate, 1Q2020

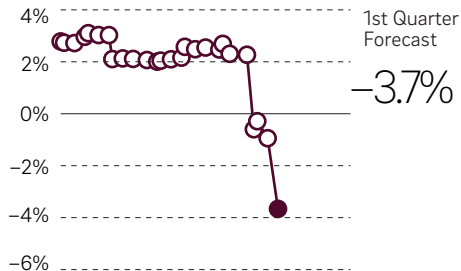
March 2: Pre-lockdown



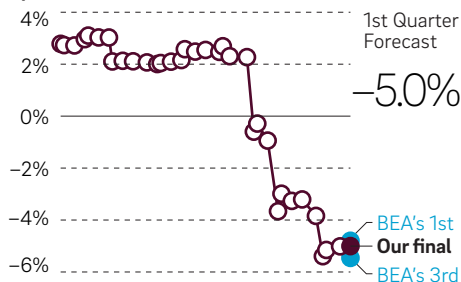
March 30: Raw steel production added



April 2: Initial jobless claims week end Mar 28 added



April 23: Final estimate



Source: All data from FRED, Federal Reserve Bank of St. Louis (<https://fred.stlouisfed.org/>), except raw steel production (from American Iron and Steel Institute), downloaded from Haver Analytics.

an all-time high of 6.6 million. We fed these data into our model, and our estimate for the annualized rate of real GDP growth in the first quarter of 2020 declined 2.7 percentage points to -3.7 percent.

As new data became available, our estimate hovered between -3 and -4 percent—until the April 15 release of industrial production data for March 2020, which lowered our estimate to -5.4 percent. Thereafter, new data pushed the real-time estimate of real GDP growth up, not down.

Our final estimate using data as of April 23 was -5.0 percent. This is remarkably close to the BEA's advance estimate of -4.8 percent (on April 29) and third estimate of -5.0 percent (on June 25), but more analysis is needed before we can draw conclusions about the predictive performance of our parsimonious model.

Regardless, as new information became available, our model's estimate approached the BEA advance estimate. This is a typical feature of models tracking real GDP growth: As the information set increases, the estimates become more accurate, on average.⁹ To see this more clearly, we computed the prediction errors (that is, the absolute value of the difference between the estimate and the realized value of real GDP growth in the first quarter of 2020), and report them in Figure 2. For ease of exposition, we focus on the prediction errors associated with

the economic releases starting on March 16 and until our final estimate on April 23. Clearly, the most accurate estimate is associated with the final date shown in the chart.¹⁰

Tracking Real GDP Growth During the Second Quarter

Figure 3 tracks the evolution of the real-time estimate for the annual rate of real GDP growth in the second quarter of 2020, starting on April 29—that is, starting on the day the BEA released the advance estimate of real GDP growth in the first quarter of 2020. The initial estimate for real GDP growth in the second quarter was a seasonally adjusted annual rate (SAAR) of -7.6 percent.

During subsequent days, we updated the model with initial jobless claims for the weeks ending April 25 and May 2, raw steel production for the week ending May 2, and real personal income and real manufacturing and trade industries sales for March. None of these releases had a significant impact on the initial estimate for the second quarter: On May 7—the eve of the release of the much-anticipated April labor report—the prediction was the same as when we began tracking the second quarter.

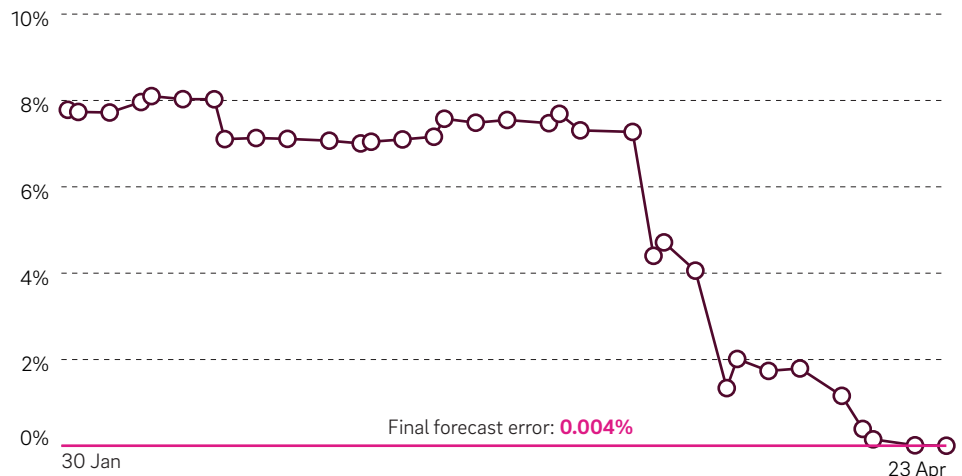
During the second week of May, the estimate plunged due to the dreary

FIGURE 2

Prediction Errors of Real-Time Estimate of Real GDP Growth in 1Q2020

Forecast error shrinks to near 0 by end of quarter.

Absolute value of the difference between estimate and realized value of real GDP growth at an annual rate in 1Q2020



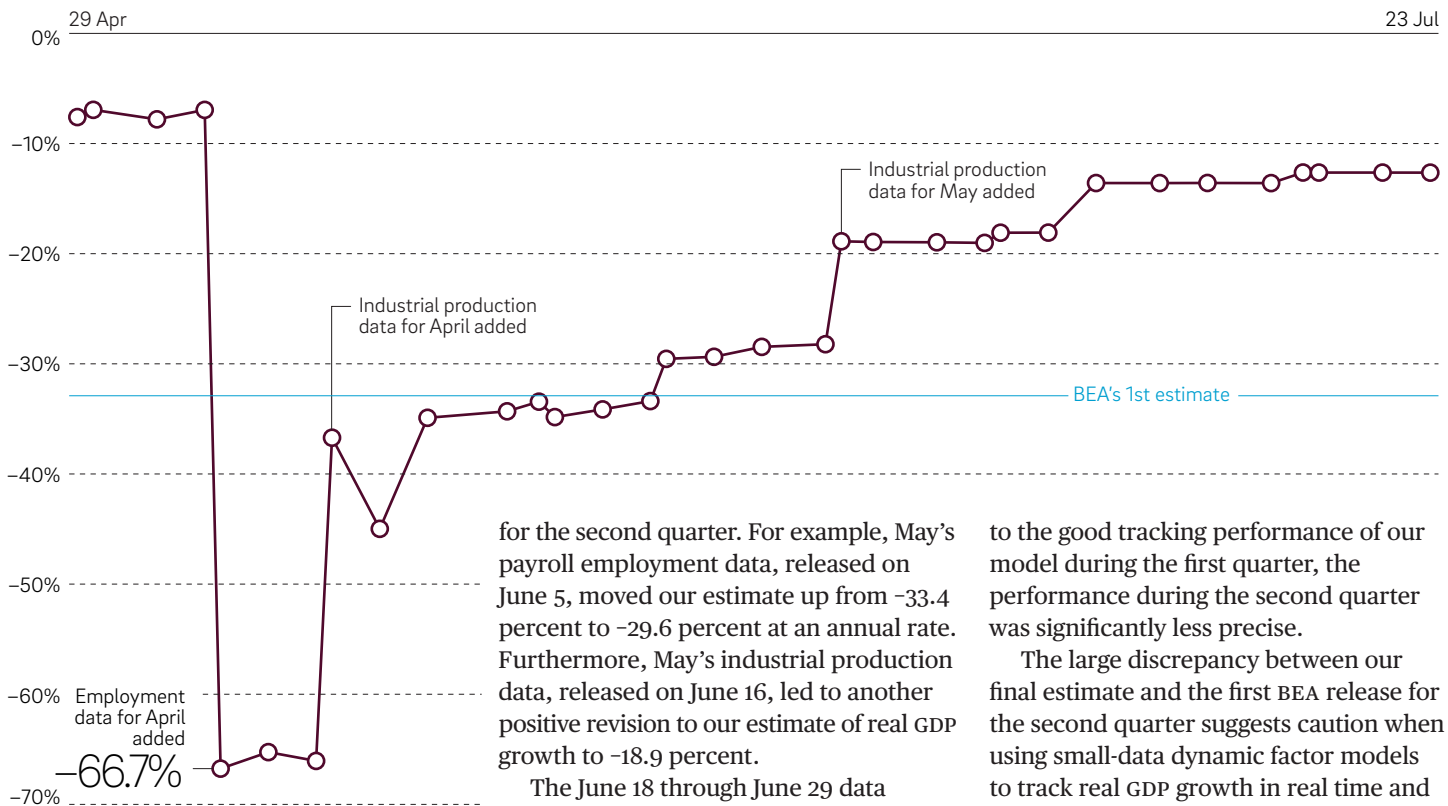
Source: FRED, Federal Reserve Bank of St. Louis (<https://fred.stlouisfed.org/>); authors' calculations.

FIGURE 3

Evolution of Real-Time Estimate of Real GDP Growth in 2Q2020

Changes in estimate reflect addition of labor and production data.

Estimated percent change in GDP at an annual rate, 2Q2020



Source: FRED, Federal Reserve Bank of St. Louis (<https://fred.stlouisfed.org/>); authors' calculations.

employment data: The employment situation summary released by the BLS on May 8 showed an unprecedented decline in nonfarm payroll employment, proof that the COVID-19 crisis had erased all the job gains since the Great Recession.

In the face of such a stunning decline in the growth rate of payroll employment, and in the absence of other monthly indicators to put the labor market data into perspective, the real-time estimate declined to an annual growth rate of -66.8 percent. Weekly data on raw steel production and initial jobless claims did not change this dramatic estimate.

The May 15 release of industrial production for April 2020 offered a less gloomy picture of the economy than the monthly labor market data. As a result, the model upwardly revised our estimate to -36.7 percent at an annual rate. Subsequent data releases from May 18 through June 5 induced further upward revisions in the estimated growth rate of real GDP

for the second quarter. For example, May's payroll employment data, released on June 5, moved our estimate up from -33.4 percent to -29.6 percent at an annual rate. Furthermore, May's industrial production data, released on June 16, led to another positive revision to our estimate of real GDP growth to -18.9 percent.

The June 18 through June 29 data releases of initial claims, raw steel production, real manufacturing and trade sales (for April), and real personal income excluding transfers (for May) did not induce significant revisions to our estimates of real GDP growth. This is because such data releases were in line with the predictions of the model. In contrast, the positive June payroll employment report (released on July 2) was a surprise for the model, leading to a positive revision of our estimate of real GDP growth of nearly 5 percentage points.

Subsequent data releases from July 6 until July 23 continued to indicate (through the lens of our model) that the decline in real GDP during the second week of May (i.e., about -67 percent at an annual rate).

In sum, our model's final estimate of real GDP growth during the second quarter of 2020 was -12.6 percent at an annual rate, about 20 percentage points more optimistic than the first estimate of real GDP growth for the second quarter released by the BEA on July 30. In contrast

to the good tracking performance of our model during the first quarter, the performance during the second quarter was significantly less precise.

The large discrepancy between our final estimate and the first BEA release for the second quarter suggests caution when using small-data dynamic factor models to track real GDP growth in real time and at high frequency during a pandemic. In particular, our conjecture is that the model puts more weight on recent data and hence the bad April data are downplayed relative to the good May and June data. We believe that this may be a feature of other types of econometric models relying on dynamic factors or vector autoregressions with mixed-frequency data. Consequently, we view our results as calling for further scrutiny of the ability of econometric models with mixed-frequency data to track real GDP growth at times of high economic uncertainty.


Conclusion

In addition to the large prediction error for the second quarter, our real-time estimates of real GDP growth were subject to large changes within the quarter. These swings could be interpreted as another undesirable consequence of tracking real GDP growth using small-data dynamic factor models. In particular, given that the model takes a signal about the state of the economy from each of the seven input variables, an unusually large variation in

one variable could cause the model to significantly change the assessment of current macroeconomic conditions. Including additional variables should shrink each variable's average contribution. For example, the model used for the New York Fed Nowcasting Report includes 37 variables.¹¹ Even so, the case against small-data approaches is not yet settled. Using more predictors doesn't necessarily lead to better forecasting.¹² Furthermore, estimates tend to stabilize as more information becomes available.

If the estimates are subject to large variations at the beginning of the quarter, when can policymakers start relying on them with confidence? Several researchers have been trying to answer this question by evaluating the out-of-sample performance of estimates generated by their models. For example, Giannone, Reichlin, and Small (2008) show that their model performs better than a no-change (random walk) forecast starting on the beginning of the second month, and it clearly has a 20 percent smaller root mean square forecast error from the middle of the second month.

Whether these results apply to our model is a question for future research, but the discussion above highlights the fact that policymakers may face an important trade-off: Either they can swiftly respond with policies conditional on a less-accurate estimate of the state of the economy, or they can delay taking action until the current state of the economy becomes clearer.

Last, the actions of policymakers affect real GDP growth. Hence, at least part of the swings in the real-time estimates of the pace at which the economy is growing is due to policy responses to shocks. Determining which fraction of the final value of real GDP growth in a given quarter is due to economic shocks and which is due to policy responses to such shocks is an active research area in economics. 

Notes

1 The term “econometrics” as we know it today was coined by Ragnar Frisch, who shared the first Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel with Jan Tinbergen in 1969. In Frisch's words: “Intermediate between mathematics, statistics, and economics, we find a new discipline which for lack of a better name, may be called econometrics.” See Bjerkholt (1995) for additional details about the term.

2 Dynamic factor models (DFMs) are econometric models whose distinctive premise is that a few unobserved (latent) variables can explain the comovement of a larger number of observed variables. See Geweke (1977), Sargent and Sims (1977), and Stock and Watson (1989).

3 See Aruoba, Diebold, and Scotti (2009), Modugno (2013), and Bańbura et al. (2013).

4 For more on this small-data dynamic factor model, see Aruoba, Diebold, and Scotti (2009).

5 All input variables except for initial jobless claims and raw steel production enter the model in log first differences. We normalize initial jobless claims by a weekly estimate of the population, and take the natural logarithm to the resulting threshold. Finally, raw steel

production enters the model in levels. Both types of variables (that is, those that are transformed and those that enter in levels) are standardized before entering the model. All data are from FRED at the Federal Reserve Bank of St. Louis, except for raw steel production (from the American Iron and Steel Institute), which we downloaded from Haver Analytics.

6 See the list of variables used by the New York Fed Weekly Economic Index.

7 We decompose the growth rate of the quarterly flow variables into the quarterly sum of daily differences of latent quarterly growth rates. An alternative option is to approximate the growth rate of the quarterly flow variables with the quarterly sum of daily log difference, following Mariano and Murasawa (2003). Such a modelling approach delivers more negative real-time estimates for the sample period under consideration.

8 See, for example, the first-quarter 2020 Survey of Professional Forecasters.

9 See Giannone, Reichlin, and Small (2008).

10 This is in line with Giannone, Reichlin, and Small (2008), whose finding is based on the

root mean squared prediction error computed using the evaluation sample from the first quarter of 1995 to the first quarter of 2005. Our Figure 3 is based on the absolute value of prediction errors computed using one evaluation sample point.

11 See Bok et al. (2018).

12 See Boivin and Ng (2006) and Bai and Ng (2008).

13 See Bańbura et al (2013).

14 For example, the BEA didn't release GDP data for the first quarter of 2020 until April 29, 2020.

15 For example, in our application for the first quarter of 2020, t_0 refers to January 1, t_1 refers to March 31, $t_0 + \Delta_0$ refers to January 30, and $t_1 + \Delta_1$ refers to April 23.

16 See Bańbura et al. (2013).

17 Examples of partial modeling include bridge equation regressions (e.g., Trehan [1989]) and mixed data sampling (MIDAS) regressions (e.g., Ghysels, Santa-Clara, and Valkanov [2004], Clements and Galvão [2008], and Marcellino and Schumacher [2010]). Full modeling

approaches include mixed-frequency vector autoregression (e.g., Zdrozny [1990], Eraker et al. [2015], and Schorfheide and Song [2015]) and a mixed-frequency dynamic factor model (e.g., Liu and Hall [2001], Mariano and Murasawa [2003], and Giannone, Reichlin, and Small [2008]). Economists have authored many academic papers on real-time tracking of real GDP growth based on those models. Here, we list just a few early papers on the topic. For a complete list of papers, see, for example, Bańbura et al. (2013).

18 See Bai, Ghysels, and Wright (2013).

References

Aruoba, S. Borağan, Francis X. Diebold, and Chiara Scotti. "Real-Time Measurement of Business Conditions," *Journal of Business & Economic Statistics*, 27:4 (2009), pp. 417–427. <https://doi.org/10.1198/jbes.2009.07205>.

Bai, Jennie, Eric Ghysels, and Jonathan H. Wright. "State Space Models and MIDAS Regressions," *Econometric Reviews*, 32:7 (2013), pp. 779–813. <https://doi.org/10.1080/07474938.2012.690675>.

Bai, Jushan, and Serena Ng. "Forecasting Economic Time Series Using Targeted Predictors," *Journal of Econometrics*, 146:2 (2008), pp. 304–317. <https://doi.org/10.1016/j.jeconom.2008.08.010>.

Bańbura, Marta, Domenico Giannone, Michele Modugno, and Lucrezia Reichlin. "Now-Casting and the Real-Time Data Flow," in Graham Elliott and Allan Timmermann, eds., *Handbook of Economic Forecasting*, volume 2, part A. Elsevier, 2013, pp. 195–237. <https://doi.org/10.1016/B978-0-444-53683-9.00004-9>.

Bjerkholt, Olav. "Ragnar Frisch, Editor of *Econometrica* 1933–1954," *Econometrica*, 63:4 (1995), pp. 755–765. <https://doi.org/10.2307/2171799>.

Boivin, Jean, and Serena Ng. "Are More Data Always Better for Factor Analysis?" *Journal of Econometrics*, 132:1 (2006), pp. 169–194. <https://doi.org/10.1016/j.jeconom.2005.01.027>.

Bok, Brandyn, Daniele Caratelli, Domenico Giannone, Argia M. Sbordon, and Andrea Tambalotti. "Macroeconomic Nowcasting and Forecasting with Big Data," *Annual Review of Economics*, 10 (2018), pp. 615–643. <https://doi.org/10.1146/annurev-economics-080217-053214>.

Clements, Michael P., and Ana Beatriz Galvão. "Macroeconomic Forecasting with Mixed-Frequency Data: Forecasting Output Growth in the United States," *Journal of Business & Economic Statistics*, 26:4 (2008), pp. 546–554. <https://doi.org/10.1198/073500108000000015>.

Corrado, Carol, and Mark Greene. "Reducing Uncertainty in Short-Term Projections: Linkage of Monthly and Quarterly Models," *Journal of Forecasting*, 7:2 (1988): pp. 77–102. <https://doi.org/10.1002/for.3980070202>.

Eraker, Bjørn, Ching Wai Jeremy Chiu, Andrew T. Foerster, Tae Bong Kim, and Hernán D. Seoane. "Bayesian Mixed Frequency VARs," *Journal of Financial Econometrics*, 13:3 (2015), pp. 698–721. <https://doi.org/10.1093/jffinec/mbu027>.

Fitzgerald, Terry J., and Preston J. Miller. "A Simple Way to Estimate Current-Quarter GNP," Federal Reserve Bank of Minneapolis *Quarterly Review*, 13:4 (1989), pp. 27–31.

Geweke, John. "The Dynamic Factor Analysis of Economic Time Series Models," in Dennis J. Aigner and Arthur S. Goldberger, eds., *Latent Variables in Socio-Economic Models*. Amsterdam: North-Holland Publishing Company, 1977, pp. 365–383.

Ghysels, Eric, Pedro Santa-Clara, and Rossen Valkanov. "The Midas Touch: Mixed Data Sampling Regression Models," working paper (2004).

Giannone, Domenico, Lucrezia Reichlin, and David Small. "Nowcasting: The Real-Time Informational Content of Macroeconomic Data," *Journal of Monetary Economics*, 55:4 (2008), pp. 665–676. <https://doi.org/10.1016/j.jmoneco.2008.05.010>.

Liu, H., and Stephen G. Hall. "Creating High-Frequency National Accounts with State-Space Modelling: A Monte Carlo Experiment," *Journal of Forecasting*, 20:6 (2001), pp. 441–449. <https://doi.org/10.1002/for.810>.

Marcellino, Massimiliano, and Christian Schumacher. "Factor MIDAS for Nowcasting and Forecasting with Ragged-Edge Data: A Model Comparison for German GDP," *Oxford Bulletin of Economics and Statistics*, 72:4 (2010), pp. 518–550. <https://doi.org/10.1111/j.1468-0084.2010.00591.x>.

Mariano, Roberto S., and Yasutomo Murasawa. "A New Coincident Index of Business Cycles Based on Monthly and Quarterly Series," *Journal of Applied Econometrics*, 18:4 (2003), pp. 427–443. <https://doi.org/10.1002/jae.695>.

Modugno, Michele. "Now-Casting Inflation Using High Frequency Data," *International Journal of Forecasting*, 29:4 (2013), pp. 664–675. <https://doi.org/10.1016/j.ijforecast.2012.12.003>.

Sargent, Thomas J., and Christopher A. Sims. "Business Cycle Modeling Without Pretending to Have Too Much A Priori Economic Theory," Federal Reserve Bank of Minneapolis Working Paper (1977).

Schorfheide, Frank, and Dongho Song. "Real-Time Forecasting with a Mixed-Frequency VAR," *Journal of Business & Economic Statistics*, 33:3 (2015), pp. 366–380. <https://doi.org/10.1080/07350015.2014.954707>.

Stock, James H., and Mark W. Watson. "New Indexes of Coincident and Leading Economic Indicators," *NBER Macroeconomics Annual*, 4 (1989), pp. 351–394. <https://doi.org/10.1086/654119>.

Trehan, Bharat. "Forecasting Growth in Current Quarter Real GNP," Federal Reserve Bank of San Francisco *Economic Review*, 1:39 (1989), pp. 39–52.

Zdrozny, Peter A. "Forecasting U.S. GNP at Monthly Intervals with an Estimated Bivariate Time Series Model," Federal Reserve Bank of Atlanta *Economic Review* 75:6 (1990), pp. 2–15.



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Bankruptcy Filings in the Third District During COVID-19

Early in the pandemic, unemployment rose dramatically. As the crisis deepens, what will happen to households and firms? We chart the past and future course of business and personal bankruptcy rates.

BY WENLI LI, RYOTARO TASHIRO, AND SOLOMON H. TARLIN

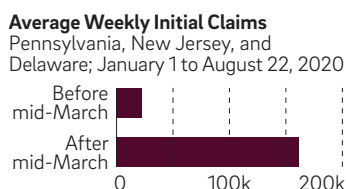
Six months after the outbreak of the COVID-19 pandemic in the U.S., what started out as a health crisis has developed into a full-blown economic crisis,¹ particularly since state governments began restricting certain business activities.²

When describing the economic impact of the pandemic, much of the attention is on unemployment. The U.S. Department of Labor reported that more than 3.7 million people had filed for initial unemployment claims in the three states of the Third District between the week ending on March 21 and the week ending on August 22, with an average of 162,000 claims per week. The average weekly initial

FIGURE 1

3.7 mn

Unemployment, Third District states insurance claims, 21 Mar–22 Aug



Source: U.S. Department of Labor.

claims for the three states in 2020 prior to mid-March was only 22,000 (Figure 1). These numbers are eye-opening, and they signal deeper financial problems.

These deeper financial problems will likely push many households and firms into bankruptcy, so we may see a large increase in the number of bankruptcies later this year. The long-term impact of the pandemic on the U.S. economy, therefore, may depend on how the bankruptcy system treats these financially distressed households and firms. For example, if some of the decline in jobs and output becomes permanent, the bankruptcy system will play an important role in determining when and how firms in distress shut

down. Similarly, the bankruptcy system will dictate whether and how soon households can have a fresh start. Only then will they be able to plan with confidence.

There are many ways financially troubled individuals and firms benefit from bankruptcy. Chapter 7 bankruptcy allows households to discharge almost all their unsecured debt, and Chapter 13 bankruptcy gives them the opportunity to reorganize their debt and catch up with their debt payments, especially secured debt payments such as mortgage payments. Similarly, Chapter 7 bankruptcy enables businesses to formally liquidate, and Chapter 11 bankruptcy allows corporations to continue operating while they work with creditors to reduce their debt.³

Past studies suggest that bankruptcies, particularly personal bankruptcies, rise during economic downturns. Using national data, Garrett (2007) found that, compared to nonrecession quarters, personal bankruptcy filing rates are significantly higher during the first quarter of a recession. On the business side, Famiglietti and Leibovici (2020) analyzed firm exit rates during the Great Recession. They found that delinquent firms were significantly more likely to go out of business during that period than firms that were initially in good financial standing.

In this article, we use bankruptcy filing data from the Administrative Office of the U.S. Courts and court-level bankruptcy filing data from the Public Access to Court Electronic Records (PACER) database to investigate both business and personal bankruptcy trends in our district and the nation. We explore how the current crisis has affected the number of bankruptcy filings in the three states of our district. More importantly, we also attempt to predict what will happen in the bankruptcy courts. Economic recovery will be hindered if bankruptcy courts are overwhelmed.

The Data

The data used in this study come from two sources. First, we use monthly bankruptcy filings data provided by the Administrative Office of the U.S. Courts. The data include counts of bankruptcy filings by chapter and are separated into business and nonbusiness

(that is, personal) filings.⁴ Unfortunately, there is a considerable lag in the data, as they are only updated quarterly. To fill in the gap with more recent figures (in particular, figures for July and August 2020), we tabulated the cases using PACER's case locator. PACER is a publicly available database comprising detailed records of all cases from federal appellate, district, and bankruptcy courts. The data are updated in real time.

From the database, we extracted the monthly count of filings by chapter and by state. The relevant chapters for this article are 7, 11, and 13. Delaware and New Jersey have only one bankruptcy district court each. Pennsylvania has three (PA-East, PA-Middle, and PA-West), so we aggregated counts from all three courts for the Pennsylvania filing count.

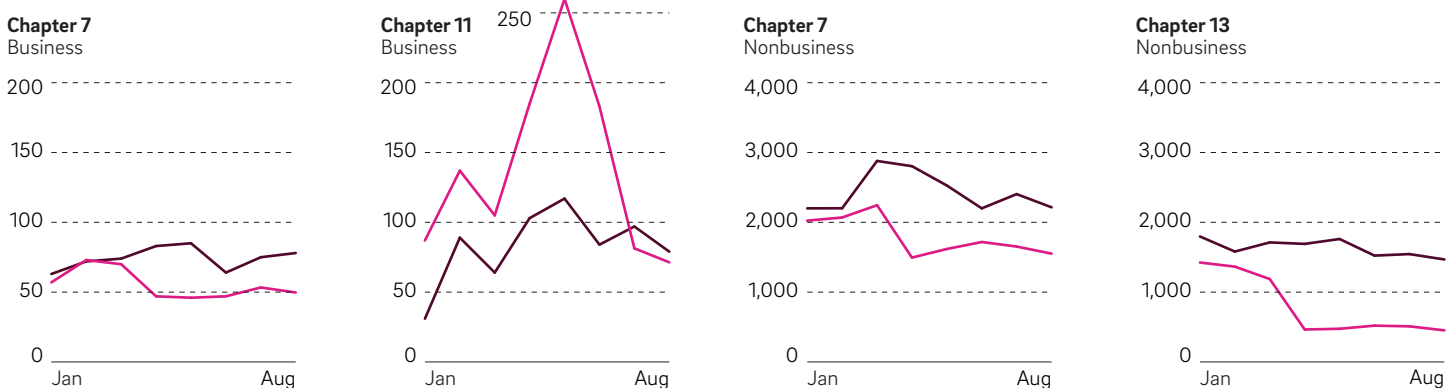
We used past bankruptcy filings data for each chapter and state to estimate the numbers of personal and business filings for the months of July and August, and to match the state data with data from the Administrative Office of the U.S. Courts. Specifically, for Chapter 7 and Chapter 13 filings, we computed the average share of business filings for each state and chapter between 2016 and the second quarter of 2020, and we applied those shares to the total filings extracted from PACER. For example, 3.25 percent of all Chapter 7 filings in Pennsylvania during that period were business filings. Therefore, we estimate that 3.25 percent of Chapter 7 cases in Pennsylvania filed in July and August were for businesses. Since the share of Chapter 11 filings seemed to change over time, we used a simple linear time-series regression to predict the share of business Chapter 11 filings for each state in the months of interest.⁵

It is important to point out that early in the pandemic, COVID-19 seriously disrupted the operations of the bankruptcy courts. For instance, the courthouses in Newark, New Jersey, closed between March 26 and April 6.⁶ Also, most courts reduced the public's physical access to the court and the clerk's office. Parties could still file electronically, but the reduced court staff couldn't process electronic filings as quickly as usual. Access to law firms and other related services was also limited during the shutdown.

FIGURE 2

Business and Personal Bankruptcy Filings in the Tri-State Area

Except for Chapter 11 business bankruptcies, filings remain below 2019 numbers. Number of filings, January through August, 2019 and 2020



Source: Administrative Office of the U.S. Courts via Haver Analytics, Public Access to Court Electronic Records (PACER).

Note: Data through June 2020 from U.S. Courts. Data for July and August 2020 are from PACER with author calculations.

Evidence from the Tri-State Region

We charted the monthly business and nonbusiness filings for the Tri-State region for the first eight months of 2019 and 2020 (Figure 2). We also charted the cumulative business bankruptcy filings as well as the nonbusiness filings for the Tri-State region for the first eight months spanning years 2006 to 2020 (Figure 3). We start at 2006 because of the implementation of the major bankruptcy reform at the end of 2005,⁷ which dramatically altered the incentives to file for bankruptcy for both businesses and households.

In the first three months of 2020, close to the same number of businesses in the Tri-State region filed for Chapter 7 (liquidation) than during the same period of 2019, and a bit more filed for Chapter 11 (reorganization). In April, however, while Chapter 7 business filings declined significantly, Chapter 11 filings surged. For the next four months, Chapter 7 filings remained low, and Chapter 11 filings began to decline. Looking at the cumulative bankruptcy filings and comparing them to those in the past (Figure 3), Chapter 7 filings this year have been at levels lower than those in the past 14 years except for 2006. Chapter 11 filings, on the other hand, surpassed all the years except 2009, the trough of the Great Recession. Note that filings in Delaware accounted for most of the Chapter 11 business filings.⁸

Among businesses filing Chapter 11 this year were restaurants and food service firms, including Così, Craftwork, Logan's, and Maines Paper & Food Service, and many health care service firms such as First Harbor Health Management, Mobile Clinic Services, and National Medical Imaging. Trucking and car rental firms also have a significant presence, as do commercial real estate firms.

The pattern for personal bankruptcies in the Third District has been much clearer. For the first two months of 2020, personal bankruptcy filings, Chapters 7 and 13, tracked their 2019 levels. After the pandemic struck in March, strikingly few households filed for either Chapter 7 (liquidation) or Chapter 13 (reorganization) bankruptcies, and the decline in monthly personal bankruptcy filings was particularly severe for Chapter 13 filings. Although the pace of the declines softened in June

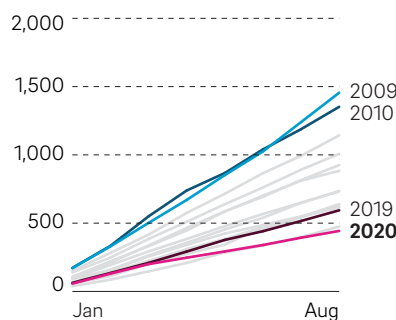
FIGURE 3

Tri-State Cumulative Bankruptcy Filings

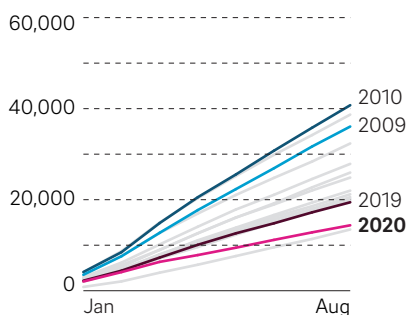
Most filings remain below numbers seen during Great Recession.

Cumulative number of filings, by chapter and year, 2006–2020

Chapter 7
Business

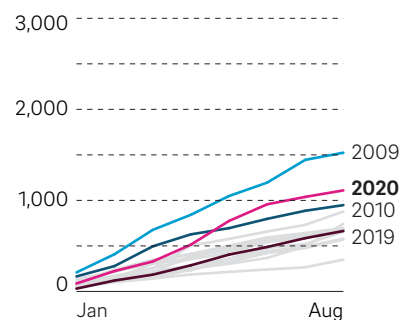


Chapter 7
Nonbusiness

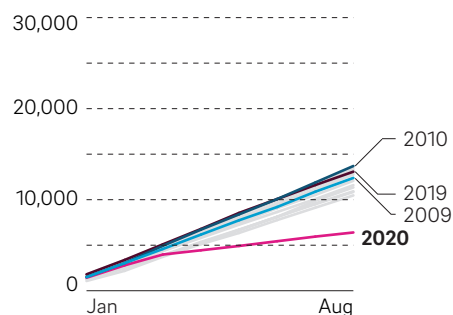


Source: Administrative Office of the U.S. Courts via Haver Analytics, Public Access to Court Electronic Records (PACER).

Chapter 11
Business



Chapter 13
Nonbusiness



Note: Data through June 2020 from U.S. Courts. Data for July and August 2020 are from PACER with author calculations.

and July, there was very little uptick in filings of either chapter (Figure 2). Compared to the previous years in addition to 2019 (Figure 3), personal bankruptcy filings have reached historically low levels since the COVID-19 outbreak.

Evidence from the Nation

The story is much the same for the whole country (Figure 4). The year began with Chapter 7 business bankruptcy filings at almost the same level as seen in recent years, but they have since dropped to the lowest level since 2006. Meanwhile, Chapter 11 business bankruptcy filings also started at a level like what we saw in recent years, but they have now exceeded all years except the four during and immediately after the Great Recession, 2009–2012.

According to numbers compiled from BankruptcyData by *Fortune*, as of June 29, the 10 industries with the most bankruptcy

filings in 2020 were restaurant; construction and supplies; real estate; health care and medical; oil and gas; retail; transportation; agriculture, forestry, and fishing; banking and finance; and telecommunications. This is consistent with what we saw in the Tri-State region.⁹

Nonbusiness bankruptcy filings under Chapter 7 are only slightly above year 2006. Nonbusiness bankruptcy filings under Chapter 13 are at the lowest level we have seen in the past two decades.

To summarize, in both the Tri-State area and across the nation, we observe a significant softening in personal bankruptcy filings since COVID-19 broke out, particularly in Chapter 13 bankruptcies. In contrast, business bankruptcy filings softened a great deal under Chapter 7 but surged under Chapter 11.

Not surprisingly, business and household loan default rates differ from bankruptcy rates in much the same way.¹⁰

FIGURE 4

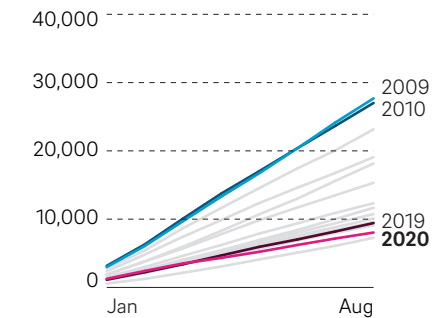
National Cumulative Bankruptcy Filings

Filings remain far below numbers seen during height of Great Recession.

Cumulative number of filings, by chapter and year, 2006–2020

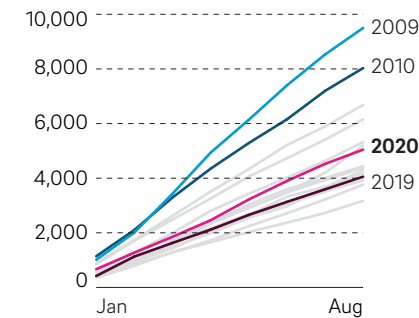
Chapter 7

Business



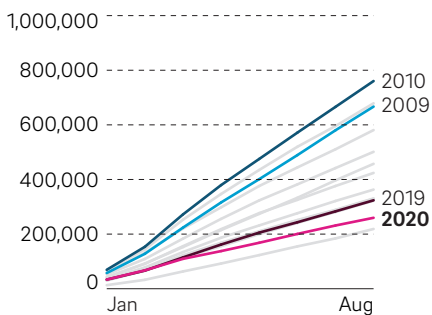
Chapter 11

Business



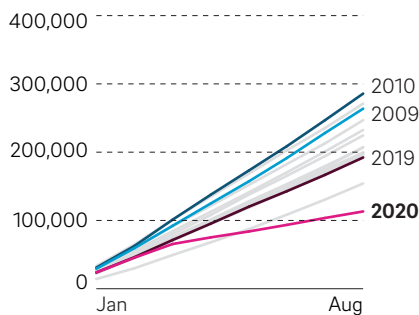
Chapter 7

Nonbusiness



Chapter 13

Nonbusiness



Source: Administrative Office of the U.S. Courts via Haver Analytics, Public Access to Court Electronic Records (PACER).

Note: Data through June 2020 from U.S. Courts. Data for July and August 2020 are from PACER with author calculations.

Corporate bond defaults rose significantly in April, when globally 25 corporate issuers (those who issued corporate bonds), or 4 percent of the total, defaulted.¹¹ This was almost 2 percentage points higher than the 2.3 percent corporate default rate we saw in April 2019. Monthly defaults hadn't been this high since the commodity downturn in May 2016 (Figure 5). And the default rate continued to climb in the following months. Meanwhile, in the leveraged-loan market, the default rate by issuer count reached 3.9 percent in July 2020, the highest it had been since September 2010 (Figure 6).¹²

By contrast, in the consumer loan market, delinquency rates on bankcards, auto loans, student loans, and mortgages had all been either stable or, as in the case of student loans, had even declined as of May.¹³

Possible Explanations for the Different Responses

Several factors likely drove this divergence in financial market performance between businesses and consumers, and between different chapters within business and personal bankruptcy filings.

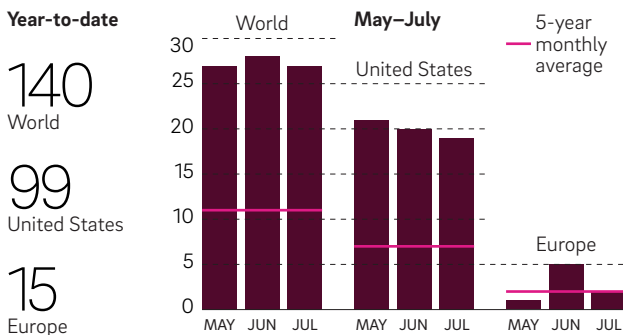
In March, as the pandemic forced states to go into varying degrees of lockdown, causing firms' revenues to plummet and freezing the financial debt markets that companies tap to raise cash, the government announced a suite of programs to

FIGURE 5

Corporate Bond Default Rates Surge

Monthly defaults haven't been this high since commodity downturn, May 2016.

Number of corporate bond defaults, by month and region, 2020



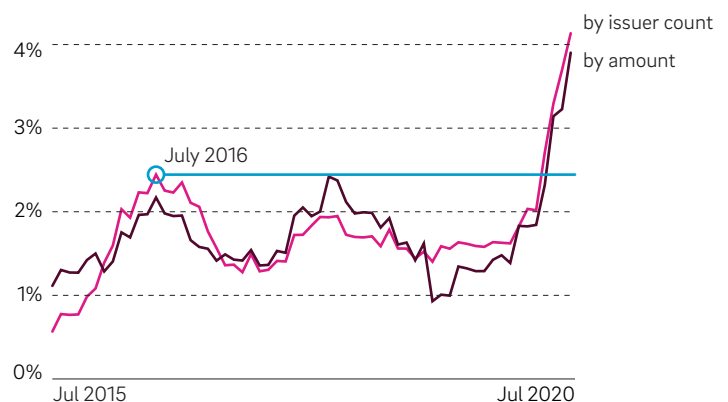
Source: Moody's Investors Service July 2020 Default Report Exhibit 1.

FIGURE 6

U.S. Leveraged Loan Default Rate

Defaults surge past 2016 peak.

Percent of loans in default, July 2015 through July 2020



Source: LCD Distressed Weekly, an offering of S&P Global Market Intelligence; S&P/LSTA Leveraged Loan Index.

help businesses and corporations. One program, the Paycheck Protection Program (PPP) for small businesses, extended loans to companies employing up to 500 people, with some exceptions. The loans are forgivable if those businesses meet program criteria, which require them to retain workers.

By buying newly issued corporate bonds, the Main Street Program (MSP), the Fed's main big-company relief initiative, offers loans to companies with up to 15,000 employees or \$5 billion in revenues. The Main Street Program is restricted to firms with highly rated debt, or those that have been downgraded only since the coronavirus crisis began.

By design, the PPP targeted almost all small businesses, and the eligibility requirement didn't depend on past business performance. The MSP, by comparison, prioritized getting help to businesses that came into the coronavirus crisis in good health. Those businesses that came into the pandemic already weak ended up in bankruptcy faster than they would have had it not been for the pandemic.

This difference alone would have led to fewer business filings under Chapter 7 than under Chapter 11, as small businesses typically file under Chapter 7. Another factor possibly explaining why business filings surged under Chapter 11 but softened under Chapter 7 is that while Chapter 11 historically has proven more useful to large businesses, changes in the federal law since the COVID-19 outbreak have made it a better option for small businesses, too. A standard filing under Chapter 11 requires a reorganization plan, which is confirmed by the court if enough creditors accept it. The seven largest unsecured creditors of the business form a creditor committee to help develop the reorganization plan. The creditor committee process can become costly, since it may involve retaining attorneys and experts to investigate the business. Those costs make it unattractive to many small-business owners. The Coronavirus Aid, Relief, and Economic Security (CARES) Act expanded the range of Subchapter V of Chapter 11 (which eliminates the credit committee requirement and allows a bankruptcy trustee to monitor the debtor's payments)

to cover more small businesses. Through March 26, 2021, a business qualifies for Subchapter V if it has up to \$7.5 million in noncontingent liquidated and unsecured debt.

Like the PPP, the various welfare programs for households directly targeted all those in need, with little regard for their financial position before the crisis. The CARES Act gave Americans who paid taxes and whose income fell below \$75,000 for single filers and \$150,000 for married filers a one-time direct deposit of up to \$1,200; married couples received \$2,400, plus an additional \$500 per child. The act also offered workers who lost their jobs or were furloughed an additional \$600 per week for four months on top of what state unemployment insurance programs paid, and it applied to the self-employed, independent contractors, and gig economy workers in addition to employees. As a result of these programs, despite unemployment and the crisis, personal income has increased during the pandemic.¹⁴

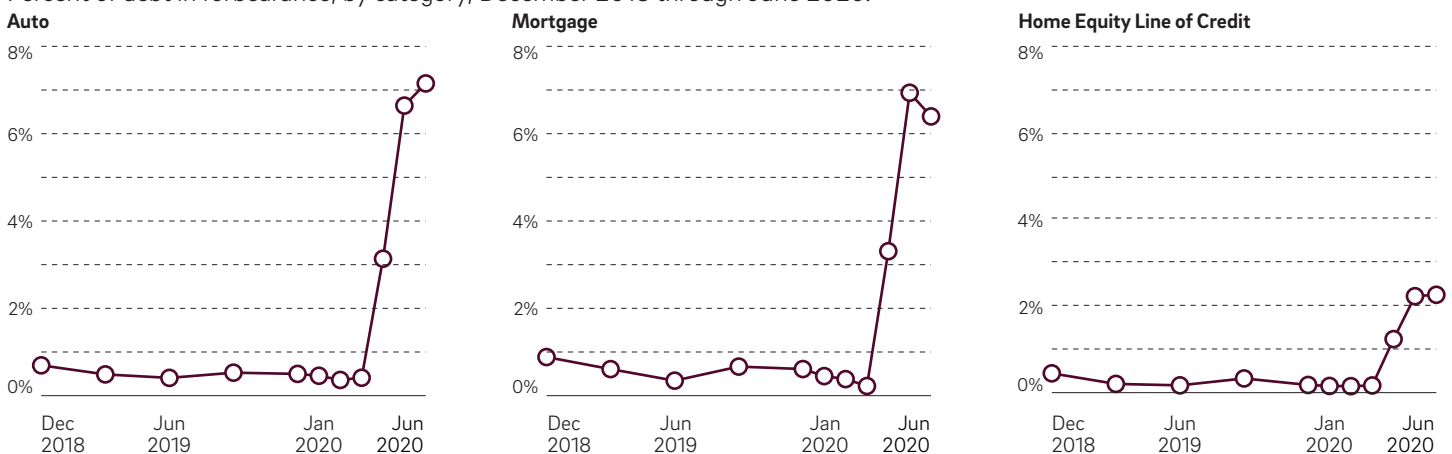
Additionally, under the CARES Act, lenders holding federally backed mortgages suspended borrowers' payments for up to 12 months if they had lost income because of COVID-19; foreclosure and foreclosure-related eviction action was suspended in many states; and federal student loan borrowers did not have to make payments for six months. During that time, federal student loan interest rates were set at 0 percent.¹⁵

One immediate implication of these welfare programs is that the share of household loans in nonpayment status could have gone up significantly without impacting the delinquency rates. Under the CARES Act, if a consumer requests a deferral and the creditor agrees, the delinquency status on the account can't get worse. That is, if the account is current, it stays current. If it is 30 days past due before, it stays 30 days past due. Using data from the FRBNY Consumer Credit Panel/Equifax, we calculate forbearance rates for different household debt, including inferred forbearance (Figure 7).¹⁶ We see that the calculated forbearance rates shot up for all three categories of consumer loans in April, May, and June. Put differently, had it not been for the welfare programs, the loan delinquency rates may have gone up significantly.

FIGURE 7

Household Debt Forbearance Rates Surge

Percent of debt in forbearance, by category, December 2018 through June 2020.



Note: Loans in forbearance are loans coded as "natural disaster" or "forbearance," including deferred and inferred forbearance.

High delinquency rates, however, may not necessarily lead to high bankruptcy filing rates, particularly for households, as we explain below.

Besides the differences in welfare programs, another key practical difference between individuals and corporations that could influence bankruptcy filing rates is that corporations can close—that is, they can exit the economy. This means that uncertainties affect individuals and corporations differently. Rational borrowers may anticipate more debt accumulation and, hence, are waiting for the “right” time to file for bankruptcy, as there is a required time length between two consecutive bankruptcy filings. For corporations, the calculation likely goes the opposite way. If a business (and its lenders) decides that it won’t be able to survive, even after reopening, then it may choose to file for bankruptcy now rather than later.

Additionally, lenders of consumer loans typically do not send their debts to collection agencies until households are already delinquent for 90 days or even 120 days. This is likely not the case with corporations, especially when a large amount of debt is involved.

Finally, individuals may have been too busy dealing with illness and covering basic needs to worry about their financial well-being, especially early in the pandemic.

What to Expect Going Forward

Uncertainty is the biggest challenge posed by the COVID-19 pandemic. We do not yet know when an effective vaccine will become available, whether the virus will mutate into something weaker or stronger, or even whether those who have recovered from COVID-19 will be susceptible to the virus again. These unknowns make policymaking extremely difficult.

Although some parts of the economy were starting to reopen by late spring, most businesses were ordered to remain closed. Even the businesses that had reopened had significant restrictions on their operations. For example, in August 2020 indoor dining for restaurants was still prohibited in New Jersey and Philadelphia, while Pennsylvania outside of Philadelphia and Delaware had a capacity limit of 25 percent and 60 percent, respectively. There is also significant uncertainty regarding how consumers will behave after shutdown orders are lifted. Social activities declined even prior to state-mandated orders,¹⁷ suggesting that changed behavior predated shutdown orders. For example, daily data from OpenTable, a popular website used to make online reservations for dining, show that the number of seated diners in the first two weeks of August 2020 in the U.S. was approximately 55 percent below the same week in 2019.¹⁸ Even at the state level, dining reservations in most states, with the exception of Rhode Island, were significantly down compared to 12 months ago.

All the original consumer welfare programs are expected to expire in the fall, with the replacement programs either currently being discussed by policymakers or set to expire at the end of the year. The additional unemployment payments lasted only four months and were terminated at the end of July. The executive order signed on August 8 replaced it; however, the new benefits are smaller,¹⁹ and the funding could run out more quickly.²⁰ The relief for student loan payments expires at the end of December.

The relief on mortgage loans will last at best to early next year. We may yet see a significant increase in delinquencies and then bankruptcy filings among businesses and perhaps even more so among households.

Should that happen, will the bankruptcy courts have the capacity to provide timely debt relief to businesses as well as households in need? According to recent research by Iverson et al. (2020) and Iverson et al. (forthcoming), there is likely to be severe court congestion in some parts of the country. These researchers first mapped the relationship between the number of bankruptcy cases per unit of unemployment and the caseload per judge. Then they asked, if every district experienced 15 percent unemployment in the second quarter of 2020 (the nationwide unemployment rate was 14.7 percent in April and 13.3 percent in May), what would the expected caseload be in each district? How many judges would be needed in each district to keep caseloads under 50 hours per week? According to their calculations, even in the most optimistic scenario, in which the large number of unemployed who believe that they are only temporarily furloughed will be back to work, the bankruptcy system will still need 50 additional temporary bankruptcy judgeships, as well as the continuation of all current temporary judgeships.^{21,22}

The most-affected workers so far have been low-wage service workers.²³ For these low-income workers, bankruptcy may not be the optimal solution to their debt problem, as they likely have few assets and perhaps low credit scores. Moreover, bankruptcy filing fees and attorney fees can add up fast, so these workers may opt for informal bankruptcy. Although they will show up in delinquency numbers, they might not show up in bankruptcy filings.

Some Final Thoughts

Bankruptcy can be costly and, in some cases, inappropriate, but it has its benefits, such as the reorganization and discharge of debts. Not surprisingly, business bankruptcy filings, particularly under Chapter 11, have begun to tick up.

However, we have yet to see an increase in personal filings. Given the past data and the current economic conditions, we interpret this as a lagged reaction rather than the lack of a response from borrowers. As many of the original government welfare programs are set to expire by the end of the summer with either no replacement or reduced benefits, we expect personal bankruptcy filings to increase in the coming months. Similarly, we also expect corporate bankruptcy filings to increase as consumers may be slow to resume their activities even after the shutdown orders are lifted.

Additional government assistance to both firms and consumers may be required to avoid a surge in bankruptcy filings. This is particularly important as the business bankruptcy system normally is supposed to separate inefficient from efficient firms and shut down only the former. But in the current environment, a firm can be in distress without being inefficient, so we want the bankruptcy courts to save most firms, at least temporarily. ■

Notes

1 According to the Centers for Disease Control and Prevention, close to 24,000 people had died of the virus in the Third District states (Delaware, New Jersey, and Pennsylvania) by August 18, 2020.

2 Restrictions began on March 24 in Delaware, March 21 in New Jersey, and March 19 in Pennsylvania.

3 Other types of bankruptcy include Chapter 12 for farming or commercial fishing businesses and Chapter 15 for foreign debtors or related parties.

4 Filings are defined as business filings if the debtor is a corporation or partnership, or if debt related to the operation of a business predominates. All other filings are considered nonbusiness filings.

5 Separately, we tried a method of separating business and individual filings using the name of the debtor, for instance, defining cases with debtor names including "Inc." as business cases. However, that calculation significantly undercounts business filings, as it does not account for cases where an individual filer owns a small business that accounts for the majority of their debt.

6 A district court can have several courthouses or seats. In the case of New Jersey, there are courthouses in Camden, Newark, and Trenton.

7 The Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 went into effect on October 17, 2005.

8 Delaware has favorable corporate taxes and regulations, which incentivize many corporations to headquarter there.

9 See Shen (2020).

10 Data for performance of small-business loans are not yet available.

11 See the Default Reports issued on August 10, 2020, by Moody's Investors Service.

12 An issuer is a legal entity that develops, registers, and sells securities to finance its operations. Issuers may be corporations, investment trusts, or domestic or foreign governments. See the LCD Distressed Weekly published in August 2020 by S&P Global Market Intelligence.

13 See the U.S. National Consumer Credit Trends Report: Portfolio issued on May 18, 2020, by the credit bureau Equifax. See also Haughwout et al. (2020).

14 See Bureau of Economic Analysis (July 31, 2020).

15 Undocumented workers didn't get either type of aid, and they are much more financially distressed. But they tend to have little access to credit and are less likely to file for bankruptcy.

16 Inferred forbearance are loans determined to be in forbearance based on payment amounts but not coded as forbearance in the narrative code. For April, this means zero payment that month and greater than zero payment the prior month. For May, zero payment in April and May,

and payment greater than zero in a prior month. We also include in this category the following narrative codes: 162 (Principal Deferred) and 163 (Payment Deferred). We thank José Canals-Cerdá, Gerald Rama, and Erik Dolson for the graphic.

17 See Farboodi, Jarosch, and Shimer (2020).

18 See OpenTable (2020).

19 The new benefits are \$300 covered by the federal government, plus an additional \$100 if the state government opts in.

20 The benefits are available until December 27, 2020, or until \$44 billion from the Federal Emergency Management Agency's Disaster Relief Fund runs out.

21 Many scholars have written to Congress calling for more bankruptcy judges for both corporate and individual bankruptcies. See Randles (2020).

22 Since the forecast, though unemployment rates have fallen a bit, there is a corresponding increase in the share of currently unemployed workers who report that their unemployment is permanent. As a result, even with updated numbers, the forecast would suggest a large need for additional bankruptcy judges.

23 For example, the net month-over-month growth rate of payroll employment in the leisure and hospitality sector between March and April was -46.7 percent, while the overall growth rate for all private sectors was -15.1 percent. The sharp decline is even more apparent when compared to some high-wage sectors: finance (-3 percent), information (-8.8 percent), and professional and business services (-9.9 percent).

References

Bureau of Economic Analysis. "Personal Income and Outlays, June 2020 and Annual Update," news release 20-38, July 31, 2020, <https://www.bea.gov/sites/default/files/2020-07/pi0620.pdf>.

Famiglietti, Matthew, and Fernando Leibovici. "COVID-19's Shock on Firms' Liquidity and Bankruptcy: Evidence from the Great Recession," Federal Reserve Bank of St. Louis *Economic Synopses*, 7 (2020). <https://doi.org/10.20955/es.2020.7>.

Farboodi, Maryam, Gregor Jarosch, and Robert Shimer. "Internal and External Effects of Social Distancing in a Pandemic," National Bureau of Economic Research Working Paper 27059, April 2020.

Garrett, Thomas A. "The Rise in Personal Bankruptcies: The Eighth Federal Reserve District and Beyond," Federal Reserve Bank of St. Louis *Review*, 89:1, January/February 2007, pp. 15-37.

Haughwout, Andrew F., Donghoon Lee, Joelle Scally, and Wilbert van der Klaauw. "A Monthly Peek into Americans' Credit During the COVID-19 Pandemic," Federal Reserve Bank of New York *Liberty Street Economics*, August 6, 2020.

Iverson, Benjamin, Raymond Kluender, Jialan Wang, and Jeyul Yang. "Bankruptcy and the Covid-19 Crisis," slides at <https://sites.google.com/site/jialanw/financial-impact-of-covid-19> (2020).

Iverson, Benjamin, Jared A. Elias, and Mark Roe. "Estimating the Need for Additional Bankruptcy Judges in Light of the COVID-19 Pandemic," *Harvard Business Law Review Online* (forthcoming).

OpenTable. The State of the Restaurant Industry, (2020). <https://www.opentable.com/state-of-industry>.

Randles, Jonathan. "Congress Urged to Bolster Nation's Bankruptcy Courts," *Wall Street Journal*, May 8, 2020.

Shen, Lucinda. "The 20 Biggest Companies that Have Filed for Bankruptcy Because of the Coronavirus Pandemic," *Fortune*, June 29, 2020.

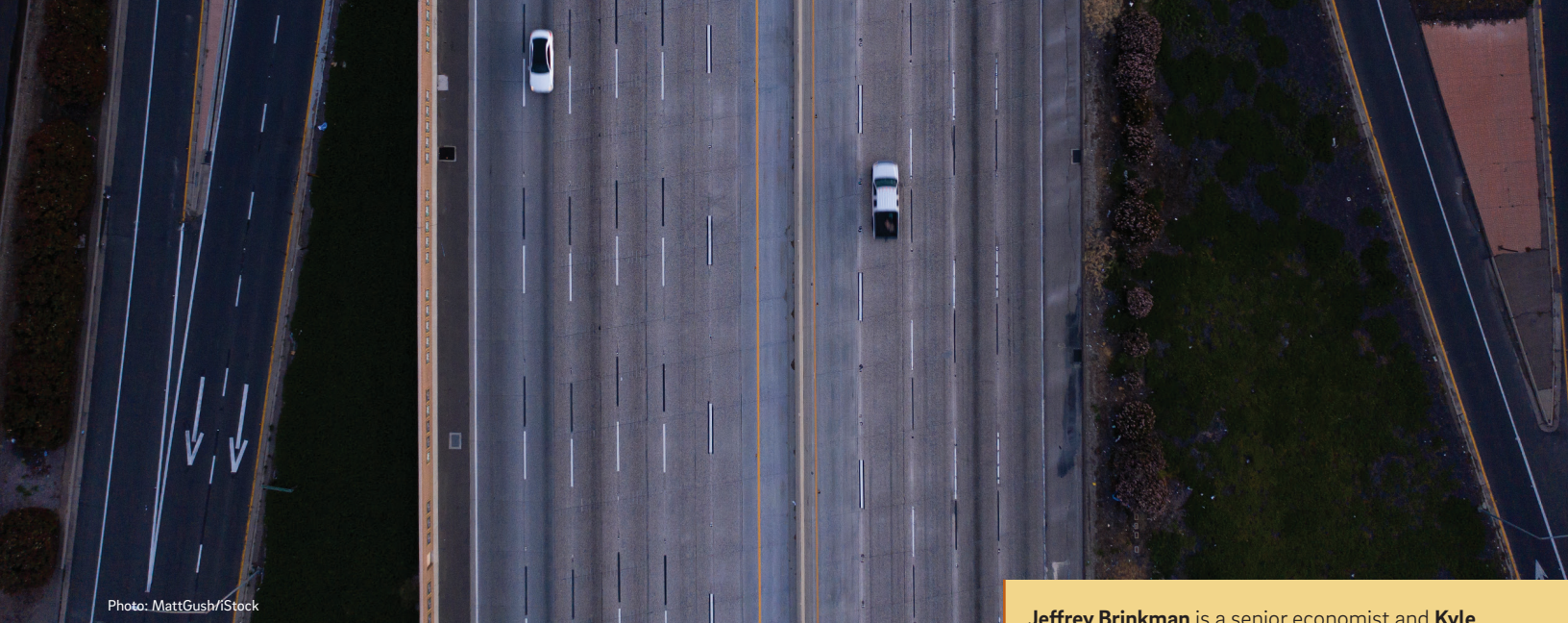


Photo: MattGush/iStock

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Travel Behavior and the Coronavirus Outbreak

Cellphone location data open a window into Americans' changing travel patterns, and how well they slowed the spread of COVID-19.

BY JEFFREY BRINKMAN AND KYLE MANGUM

As COVID-19 swept the nation, policymakers sought to limit its spread by restricting mobility. State and local governments issued stay-at-home orders, closed nonessential businesses, and limited mass gatherings. How effective were these policies at limiting mobility and, by extension, slowing the spread of the virus? To find out, we examined the aggregate movement of cellphones over the course of the outbreak. We then analyzed how travel patterns changed in terms of both how much and where people traveled.

Unsurprisingly, overall travel declined significantly as the number of cases grew. By comparing counties, we found that overall travel declined in response not just to government orders but also to the number of cases locally and in nearby counties. Moreover, people's travel patterns changed in ways that limited their exposure. They reduced mobility overall as cases rose locally, but they also traveled less to locations with a high number of cases. Our measures indicate that this limited people's overall exposure and reduced the spread of the coronavirus. We conclude that providing clear and timely information about the geography of the outbreak should be a policy priority.

Using Cellphone Data to Measure Changes in Mobility

Mobility declined significantly with the onset of the pandemic in the U.S. To analyze this decline, we relied on county-level location exposure (LEX) indices.¹ These indices are constructed by calculating the percentage of cellphones in a county on a particular day that were in another county in the previous two weeks.² These data measure the connectedness of counties by describing a network of bilateral travel flows between all U.S. counties.

For example, on Wednesday, February 8—several weeks before cases spiked in the U.S.—over 90 percent of phones in Philadelphia had also been in the city in the previous two weeks (Figure 1, top panel). Forty-three percent of phones located in Philadelphia on that day had also been in Montgomery County, a suburb to the immediate northwest of Philadelphia, at some point in the previous two weeks.

By Wednesday, April 8, the LEX data had changed (Figure 1, bottom panel). Phones located in Philadelphia on April 8 were much less likely to have been in other counties in the previous two weeks. Montgomery County saw the largest decline: 10 percentage points, from 43 percent to 33 percent. This represents a 23 percent decline in travel between these two counties.

Predicting Declining Mobility

Coronavirus cases rose rapidly in the U.S. beginning in early March, but the severity of the outbreak varied by location. Of the central counties of five large metro areas (New York, Los Angeles, Chicago, Houston, and Philadelphia), New York experienced by far the most severe coronavirus outbreak.³

There were also clear differences in the timing of the outbreak across counties. In New York City's five counties there were 100 total cases on March 13, while Harris County (home of Houston, Texas) did not reach that threshold until March 24.

To further investigate how travel behavior changed after the onset of the

pandemic, we used the LEX data to construct a county-level measure that captures how much people travel into and out of a county. Specifically, we counted the total number of cellphones located in a county on a particular day that were also located in a different county in the previous two weeks.

We plotted this measure of mobility as a seven-day moving average for the same central counties, indexed to the average over the last two weeks of January (Figure 2). The index declined in all counties with the onset of the pandemic. Notably, the timing and magnitude of the decline varied by county. For example, mobility in New York, where the outbreak was

especially pronounced, had declined sharply by mid-March. Houston's decline in mobility was later and less pronounced. In both counties, the decline in mobility corresponded with the increase in coronavirus cases locally.

We tested the correlations between changes in mobility and the number of observed new cases over the previous two weeks using the data for more than 2,000 U.S. counties.⁴ We also accounted for government orders that limited gatherings, closed businesses, or required people to stay home. We found that people did limit mobility in response to government orders, but the prevalence of cases independently explains much of the observed mobility reduction. Failure to account for this behavioral response overestimates the effectiveness of government orders.

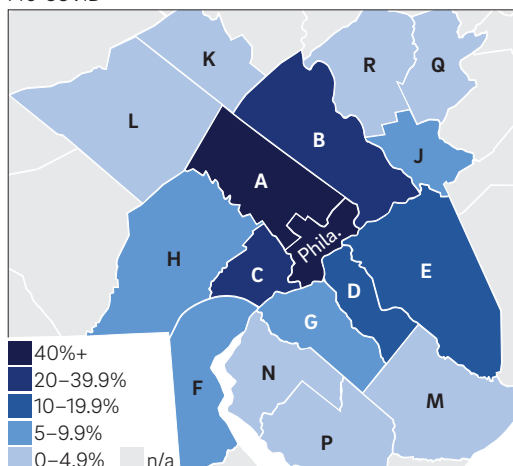
FIGURE 1

Travel In and Out of Philadelphia Plummets in Response to COVID

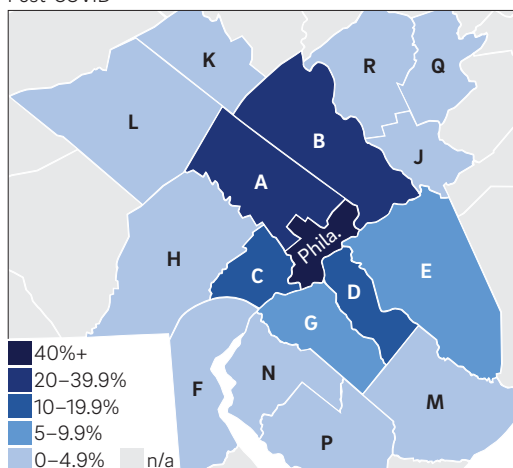
Travel to and from Montgomery County sees the biggest drop.

County-level location exposure (LEX) indices, Philadelphia metropolitan statistical area, February 8 & April 8, 2020

Pre-COVID

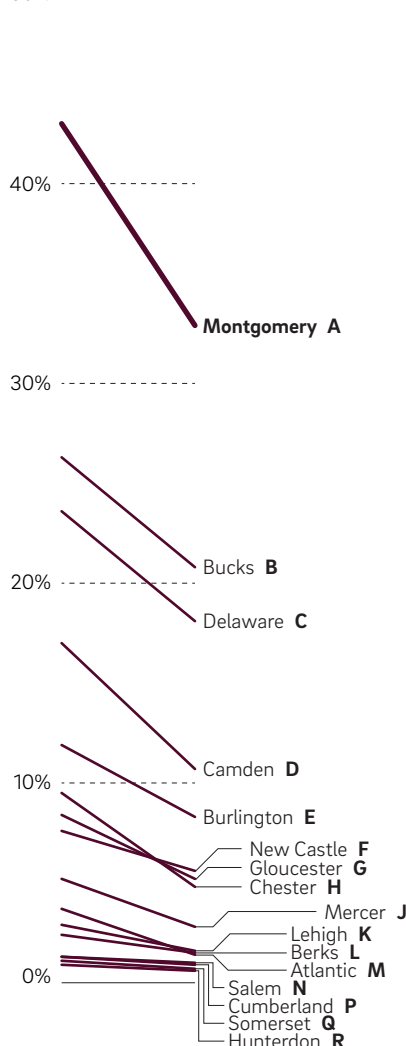


Post-COVID



Source: Couture et al. (2020), derived from anonymized, aggregated smartphone movement data provided by PlacelQ.

The COVID Effect
50%



Mobility, Exposure, and Travel Behavior

Overall travel declined, but did people also change where they travelled to? If the goal of reduced mobility is to reduce exposure to the virus, policymakers would want people to travel less but also to avoid locations with a high number of cases.

To study exposure, we measured how many people in each county traveled to other counties where there were already confirmed cases. Specifically, for each county we multiplied the number of cellphones that appeared in another county in the previous two weeks by the number of cases in that county. We then summed across all destination counties to calculate an exposure measure. This exposure measure will decline if people travel less, but also if they avoid counties with a high number of virus cases.

Figure 3 shows an example of this exposure measure for the Philadelphia metropolitan area.⁵ The actual exposure measure is plotted in burgundy. By “exposure” we mean contact with counties outside of Philadelphia. It starts at zero before cases appear and gradually rises throughout the sample, despite the decline in travel.

We then computed what the exposure would have been had travel behavior remained unchanged during the outbreak. First, the blue line shows what the exposure would have been had people

not changed their travel behavior at all. This assumes that people continued to travel as they did before March 1, even as the number of coronavirus cases rose. This counterfactual suggests that the exposure measure would have been twice as high on May 1 had there been no change in mobility.

The second counterfactual, plotted in pink, shows what the exposure measure would have been if people reduced travel overall but did not change the locations they traveled to. In other words, we assume that total travel to other counties was reduced, but the share of travel to each county did not change. In this case, exposure declined, but not to the extent actually observed. This is evidence that people avoided locations where cases had grown, and this significantly reduced overall exposure.

Exposure and Case Growth

How did the reduction in mobility and exposure affect the spread of the coronavirus? It can be difficult for policymakers to answer this important question because of reverse causality: A decline in mobility can cause a reduction in the spread of the virus, but the spread of the virus can also cause a reduction in mobility.

To resolve this dilemma, we disentangled these effects by separately using as explanatory variables a measure of generic mobility and a measure of virus exposure. The former varies with the level of travel while the latter varies with travel to destinations with relatively higher case counts. We found that mobility alone—that is, detached from destination case counts—is not correlated with the spread of the virus. When we used our measure of case exposure—that is, mobility to areas with more cases—we found a positive correlation between exposure and new cases.⁶ We estimate that a 1 percent increase in the exposure measure is associated with a 0.1 to 0.2 percent increase in new daily cases. In other words, movement between counties increased the spread of the coronavirus. However, reductions in mobility likely resulted in significantly slower spread, given that overall exposure in the U.S. at the end of April was half as high as it would have been if people hadn't traveled less often to locations with fewer cases.⁷

Conclusion

Travel patterns changed in the U.S. during the coronavirus outbreak. People adjusted their travel patterns based on available information about the number of cases locally. Not only did people reduce overall travel but they avoided locations with a prevalence of cases. This significantly decreased exposure to and, in turn, reduced the spread of the virus.


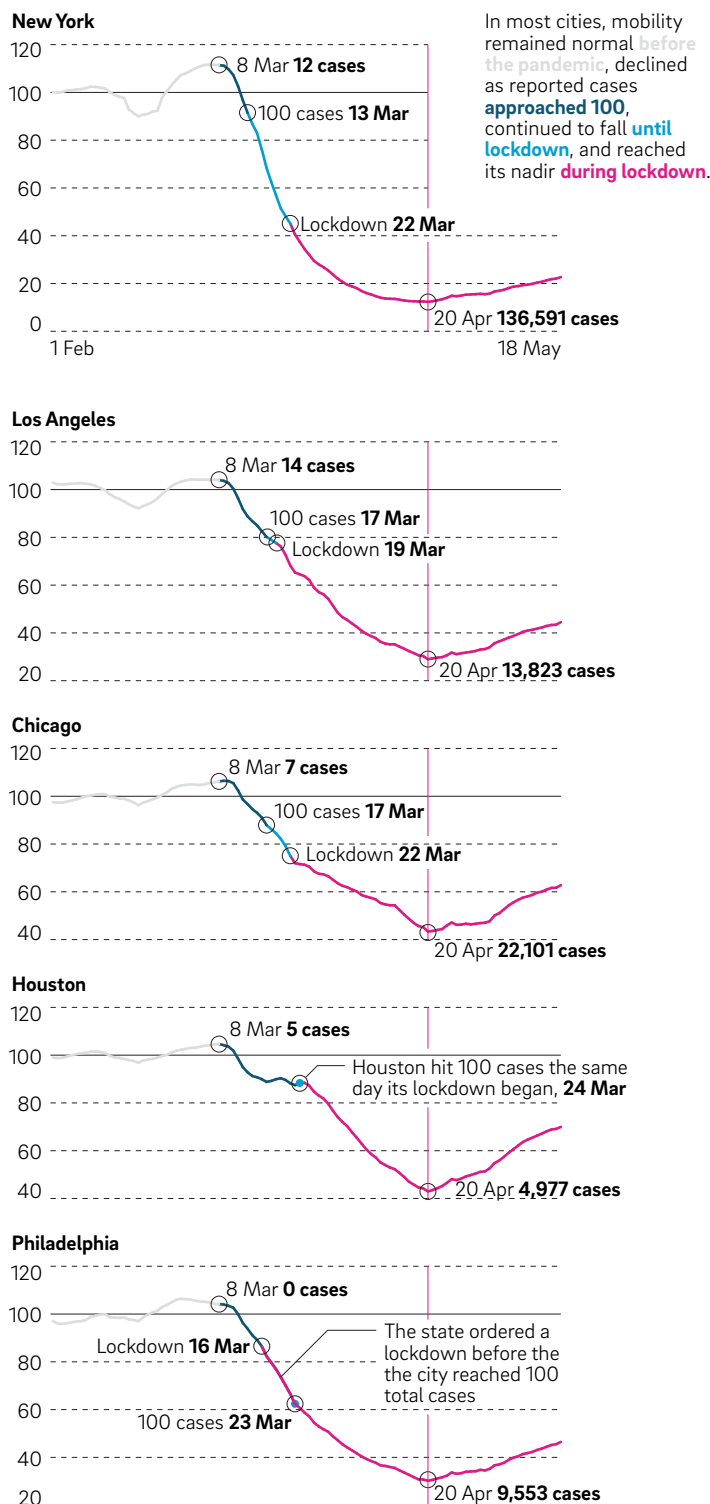
If travel outside of localities affects the spread of the virus, and if travel patterns change in response to outbreaks, there are two related implications for policymakers. First, accurate and timely information about cases and deaths should be a priority. Second, multiregional coordination and information sharing could be important policy tools in the fight against the coronavirus. 

FIGURE 2

Mobility Declined in All Counties

LEX indices, plotted as a 7-day moving average indexed to the average over the last two weeks of January; central counties of five largest metros, Feb 1 to May 18, 2020



Note: We define "lockdown" as the period during which there is a government-mandated stay-at-home order. When a municipality and a state both issued stay-at-home orders, we chose whichever date came first.

Source: Couture et al. (2020), derived from anonymized, aggregated smartphone movement data provided by PlacelQ.

Our Methodology

For each home county, we calculate the total number of cellphones that appear in that county on a given day and also appeared in another county in the previous two weeks. We denote this value as the number of trips.

To construct an exposure measure, we multiply the number of trips to a location (N_d) by the number of cases in that location (C_d) on each day. We then sum the resulting products across all destination counties. In other words, this exposure measure, which is plotted in burgundy in Figure 3, is calculated by

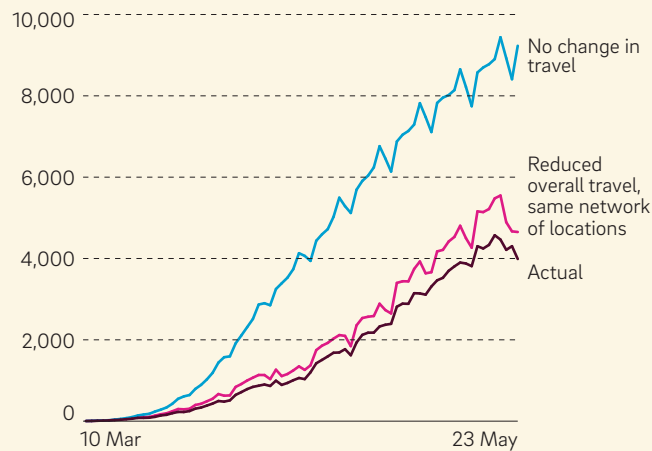
$$\text{exposure} = \sum_d N_d \times C_d$$

Our first counterfactual uses the same county case data but fixes the trips at pre-COVID-19 levels. In other words, we assume that travel behavior does not change

FIGURE 3

Reductions in Mobility Reduced Exposure to Virus

Exposure index, Philadelphia metro area, March 10–May 23, 2020



Source: Couture et al. (2020), derived mobility data from anonymized, aggregated smartphone movement data provided by PlacelQ; case data come from the COVID-19 Dashboard of the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University, <https://systems.jhu.edu/>.

Note: To compute the exposure index, we multiplied the number of cellphones that appeared in another county in the previous two weeks by the number of cases in that county. We then summed across all destination counties.

at all (remaining at a fixed, prepandemic value of N_d), but we let cases evolve as they actually did in the data. This is the blue line in Figure 3.

Next, we decompose the trip data to better understand how travel behavior changed. The total trips to a destination from a home county is by definition the total number of trips from a home county to any location (N) multiplied by the fraction of total trips to that destination (F_d). This decomposition can be written as

$$N_d = N \times F_d$$

By decomposing the trips in this way, we can calculate the exposure measure while assuming that the total number of trips declined as in the data (that is, N declines), but that the fraction of trips to each destination remained the same as during the preperiod (that is, F_d is fixed). This is the counterfactual exposure measure plotted in pink in Figure 3.

Notes

1 These indices were created by Couture et al. (2020), derived from anonymized, aggregated smartphone movement data provided by PlacelQ. The LEX data and a more detailed description can be found at <https://github.com/COVIDExposureIndices>.

2 More precisely, the data measure whether a cellphone pings in a county. Pings occur for a variety of reasons, including when a phone is turned on or is moved into the range of a different cell tower.

3 Data from the COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University, <https://systems.jhu.edu/>. The authors downloaded the data from <https://github.com/CSSEGISandData>. Data visualizations can be found at <https://coronavirus.jhu.edu/>.

4 The correlations are apparent when measuring new cases in a variety of time windows, ranging from one- or two-week lags to the cumulative count from the start of the outbreak.

5 We calculate a weighted average of the exposure measure for all counties in the Philadelphia metropolitan area.

6 In our 2020 working paper, we also employed an instrumental variable strategy using government shutdown orders to estimate the causal effect of exposure on new cases and we found similar results.

7 Note that these estimates are based on a direct effect on new daily cases early in the pandemic and not a complete model of long-run transmission of the disease. In our 2020 working paper we used a simple model of disease transmission based on these estimates to understand how the disease may have spread differently under counterfactual mobility scenarios.

References

- Brinkman, Jeffrey, and Kyle Mangum. "The Geography of Travel Behavior in the Early Phase of the COVID-19 Pandemic," Federal Reserve Bank of Philadelphia Working Paper, forthcoming.
- Couture, Victor, Jonathan Dingel, Allison Green, Jessie Handbury, and Kevin Williams. "Measuring Movement and Social Contact with Smartphone Data: A Real-time Application to COVID-19" (2020).
- Dong, Ensheng, Hongru Du, Lauren Gardner. "An Interactive Web-based Dashboard to Track COVID-19 in Real Time," *Lancet: Infectious Diseases*, 20:5 (2020), pp. 533–534. [https://doi.org/10.1016/S1473-3099\(20\)30120-1](https://doi.org/10.1016/S1473-3099(20)30120-1).
- Johns Hopkins University Center for Systems Science and Engineering (JHU CSSE), <https://systems.jhu.edu/> (2020).



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Banking Trends

Why Don't Philly Banks Make More Local CRE Loans?

Nationally, local banks do a large share of commercial real estate lending, but this isn't true in Philadelphia. We take a trip through the geography, history, and data of this unusual banking market.

BY JAMES DISALVO

Between 2011 and 2017, the Philadelphia area experienced a commercial real estate (CRE) boom. New construction, rehabbing, and sales of existing properties were all at high levels. Where did the funding for all of these projects come from?

Throughout the nation, banks are by far the largest CRE lenders, and small banks capture a large share of this lending. Relative to large banks, small banks excel in local knowledge and local relationships, giving them a comparative advantage in making these loans.

However, using data from Real Capital Analytics, I found that local banks originate a surprisingly small share of CRE loans in the Philadelphia market. To find out why, I examined the types of banks making these loans.

Small Banks Are Strong Competitors in CRE Lending Nationwide

Along with small-business loans, CRE loans are the bread and butter of small banks. Nationwide, small banks (those with less

than \$10 billion in assets) are the largest holders of CRE loans. They hold over 40 percent of CRE loans made by banks, even though they hold less than 15 percent of total assets (Figure 1).¹ CRE loans are one of the few remaining areas in which small banks enjoy a competitive advantage over medium-sized and large banks, according to banking analysts.

There are several reasons why small banks have an advantage in CRE lending. First, small banks draw the vast majority of their customers from the area around their headquarters. That means they are likely very knowledgeable about market conditions, including areas with under- or overvalued properties, areas likely to have neighborhood opposition to a project, and the best and worst developers.

Their proximity to the market may be important in other ways as well. Local lenders can better monitor a project by visiting the site, and they can schedule meetings with the developer to discuss problems that might arise. They may also be better connected to relevant local parties, including developers, investors, contractors, labor leaders, and politicians. For example, members

of Philadelphia's City Council can use their prerogative to hold up projects in their own elective districts.² Understandably, developers and lenders benefit from cultivating relationships with these local politicians.

Bank balance sheets provide direct evidence of small banks' comparative advantage in CRE lending. Nationally, CRE

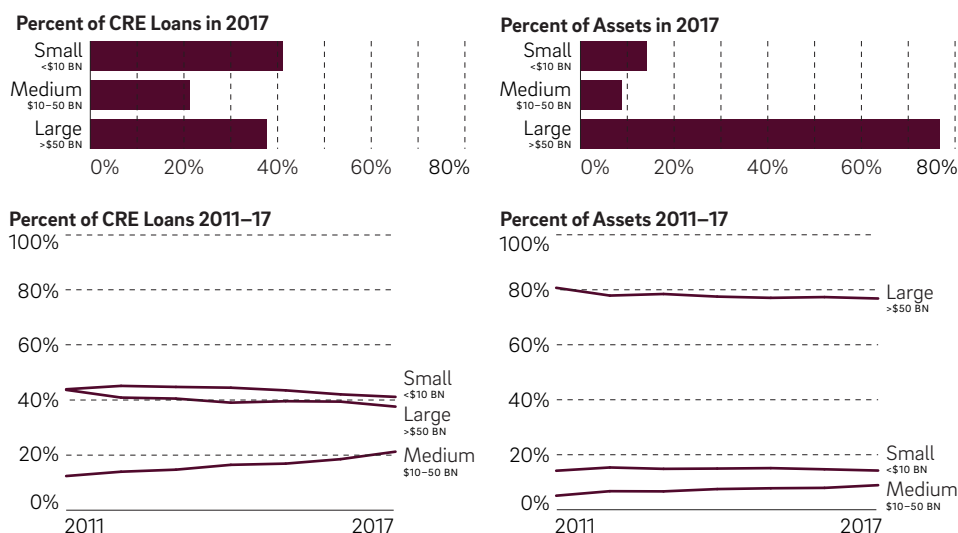
loans represent just over 30 percent of their total assets in aggregate (Figure 2). This compares with about 5 percent for the largest banks. In Philadelphia, CRE loans represent only a slightly smaller share of assets—a little over 27 percent. And yet, local banks are only minor players in the Philadelphia CRE lending market.

FIGURE 1

Nationally, Small Banks Are Largest Holders of CRE Loans

They hold a competitive advantage when it comes to these loans.

Percent of all CRE loans nationwide; percent of all CRE assets nationwide; bars, 2017; lines, 2011–2017



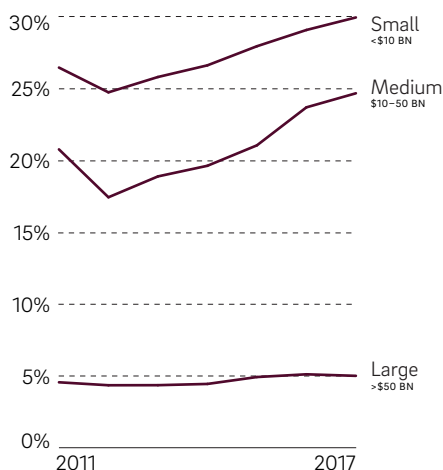
Source: FFIEC Call Reports and Federal Reserve FRY-9CS.

FIGURE 2

Bank Balance Sheets Show Small Banks' Competitive Advantage

By 2017, CRE loans represented over 30 percent of their total assets.

Percent of total assets nationwide, 2011–2017



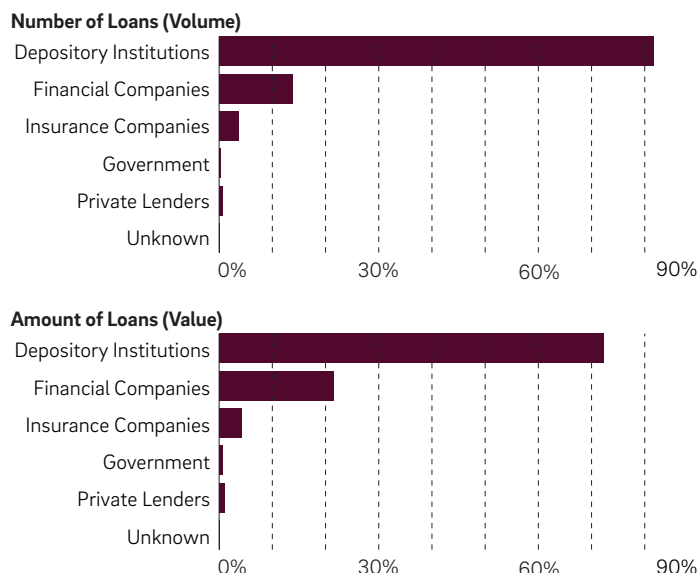
Source: FFIEC Call Reports and Federal Reserve FRY-9CS.

FIGURE 3

Depository Institutions Are Largest CRE Lenders in Philadelphia Market

They dominate in both volume and value of CRE loans.

Number of and value of CRE loans by category of lender, Philadelphia lending market, 2011–2017



Source: Real Capital Analytics, Inc. <https://www.rcanalytics.com/>.

Note: Philadelphia lending market comprises Burlington, Camden, Cumberland, Gloucester, Mercer, and Salem counties in New Jersey, and Bucks, Chester, Delaware, Montgomery, and Philadelphia counties in Pennsylvania.

Who Does CRE Lending in Philadelphia?

As in most of the nation, banks and other depository institutions are by far the largest CRE lenders in the Philadelphia market.³ Between 2011 and 2017, they made about 81 percent of the number of loans and about 72 percent of the dollar value of loans (Figure 3).⁴

Depository institutions dominated not just overall lending but also every category of CRE lending. Banks' closest competition came from nonbank financial firms, but only for loans secured by apartment buildings and possibly office buildings. All of the other operators—insurance companies, government and quasi-government agencies, and private lenders—are at best fringe competitors.

Because banks have such a dominant market share, and because I have accurate data on the locations of their headquarters and branches as well as their size, I limit my analysis to the activities of banks and other depository institutions, which I refer to as banks.

Local banks (that is, banks headquartered in the Philadelphia market) capture only a small share of Philadelphia CRE loans (Figure 4). The data show that Philadelphia-area banks originate about 22 percent of the number and about 10 percent of the dollar value of loans in this

market. In part, this finding probably reflects data limitations; most notably, the data cover only transactions where the sale price was over \$1 million. Local banks likely have a larger share of smaller CRE loans. Regardless, the question remains: Who is making these larger loans? And why don't standard theories about local lenders' comparative advantage apply in Philadelphia?⁵

See A Note on the Data

Philadelphia-Market Banks Are Small

Local Philadelphia banks are quite small compared with banks nationally.⁶ As of year-end 2017, banking organizations headquartered in the Philadelphia area had average total assets of \$915.4 million. The mean size for banking organizations in the nation was \$3.8 billion. The largest bank in the Philadelphia area had \$5.8 billion in total assets, and the last large bank to be headquartered here, CoreStates Financial, was acquired by First Union Corporation (a North Carolina bank, now part of Wells Fargo) in 1998.⁷ Maybe local banks are just too small to originate many large loans.

Some evidence suggests that, even among nonlocal lenders, bank size plays a significant role in local CRE lending. In Philadelphia, large banks supply about 49 percent of the number and about 72 percent of the dollar value of loans made by nonlocal lenders (Figure 5, top two bars).⁸ Furthermore, putting loan size into quartiles shows that large banks have a commanding share of both the number and the value of the largest quartile (Figure 6). So the lack of many large local banks in Philadelphia partly explains why so many CRE loans are made by nonlocal banks.

But bank size is not the whole story. These same data indicate that, although large, nonlocal banks do make the largest loans, many nonlocal lenders in the Philadelphia market are not large. As Figure 5 shows, in Philadelphia only a little less than half of the loans (by number) are made by large nonlocal banks.

Conversely, large nonlocal banks do compete successfully against local banks even for smaller loans. About one-third of both the number and the value of the low-

est quartile of loans—presumably loans that could have been made by local banks—are made by large organizations (Figure 6).

Although structural issues such as bank size are important, something more than size explains why local banks have such a small share of the local market.

The Philadelphia Banking Market Is Close to Other Large Banking Markets

One unique feature of Philadelphia is its proximity to active banking markets in New York, northern New Jersey, and Delaware.⁹ Lenders from these areas account for about 56 percent of the number and 57 percent of the dollar value of loans made by nonlocal lenders in the Philadelphia market (Figure 5, middle two bars).

Unlike urban areas in most of the rest of the country, Philadelphia's neighboring cities are close and easily accessible in either direction. New York City is about a 90-minute drive from Philadelphia, and there are numerous links by train and bus. Northern New Jersey has the same train and bus links, and it is even closer by car. Wilmington, Delaware, is about a 40-minute drive from central Philadelphia, and it is accessible by both Amtrak and local public transportation.

These distances may be longer than the typical distance between a small bank borrower and a lender, but they are close enough for a loan officer to schedule a morning site visit or meeting with the property developer and be back in their office by early afternoon.¹⁰ Also, these distances may be even shorter than they appear because a substantial share of the loans are made by banks with a branch presence in the Philadelphia market.

A Local Branch May Substitute for a Local Headquarters

Many nonlocal banks maintain branches in the Philadelphia market. Having a local branch may be a good substitute for being headquartered in the area. Branch employees, such as the branch manager and lending staff, can cultivate relationships and develop specialized local knowledge, much like locally headquartered banks.

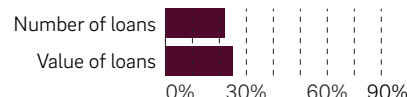
In addition, many local branches were acquired as a result of mergers; in those cases, the relationship was already in place,

FIGURE 4

Local Banks Capture Small Share of Philadelphia CRE Loans

Banks headquartered outside the Philadelphia market dominate the local market by both number and dollar volume.

Number and value of CRE loans made by local banks, Philadelphia market, 2017

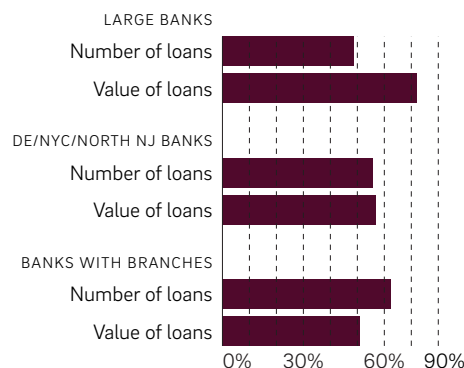


Source: Real Capital Analytics, Inc. <https://www.rcanalytics.com/>.

FIGURE 5

Size and Location Help Nonlocal Banks Compete

Value and number of loans by category of lender, as percentage of all nonlocal Philly CRE loans, 2017

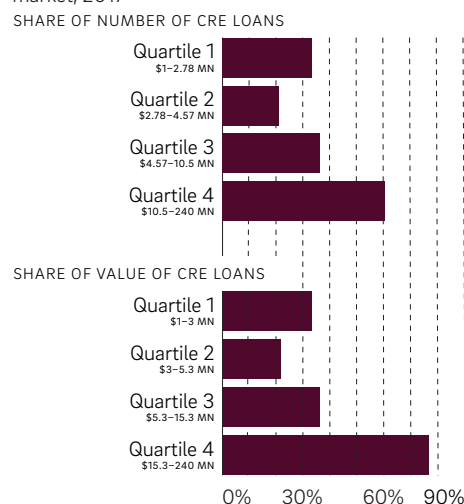


Source: Real Capital Analytics, Inc. <https://www.rcanalytics.com/>.

FIGURE 6

Large Nonlocal Banks Take a Bigger Share of the Larger Loans

Large nonlocal lenders' share of number and share of value of CRE loans, quartiles, Philadelphia lending market, 2017



Source: Real Capital Analytics, Inc. <https://www.rcanalytics.com/>.

A Note on the Data

Most of the data used in this paper were supplied by Real Capital Analytics. RCA collects data on commercial real estate transactions where the amount lent is at least \$1 million. To identify lenders, I used my local knowledge of the Philadelphia banking market to get an accurate measure of the loans originated by locally headquartered banks in the data set. Some transactions involved multiple loans on multiple properties; some even involved multiple lenders. If the deal involved multiple lenders, I dropped it from the data because I was unable to determine the lead lender.¹¹ I counted as one loan those deals involving the same lender but multiple loans. I analyzed only property sales.

Although this data give an accurate picture of the CRE lending market in Philadelphia, RCA's data set excludes loans smaller than \$1 million, which may still be too high for some small banks. I suspect that local banks have a stronger presence in the market for small CRE loans.

How much of the CRE lending in the market is accounted for by RCA? I got a rough estimate of the data coverage, at least among local lenders. I took the local lenders that appear in the RCA data set in any year and looked at their CRE loans outstanding, taken from the Reports of Condition. I then compared those outstanding loans to total CRE loans for all banks headquartered in the market. There is no simple mapping of loan originations to outstanding loans on bank balance sheets, but this exercise provides some evidence about the share of bank CRE lending that is captured by RCA.

I found that I captured about 71 percent of local CRE loans on bank balance sheets between 2012 and 2016. I then compared the banks included in the RCA sample with those excluded from the sample. There was a difference between their average sizes—\$1.9 billion and \$342.6 million in assets, respectively, as of year-end 2017. There was also a substantial difference in the percent of their assets in CRE loans. In-sample banks had on average 36.8 percent of their assets as CRE loans, compared with 18.2 percent for out-of-sample banks, including a number of banks with no CRE lending at all. RCA is capturing loans made by local banks that are more active in the CRE market.

requiring only that it be maintained. For example, WSFS Financial of Wilmington, Delaware, recently acquired Beneficial Savings Bank of Philadelphia. WSFS already had several branches in the suburbs, but Beneficial's roots in the area went back to the mid-19th century, and it had a substantial branch network in both the city and the suburbs.

Consistent with the view that a local branch may substitute for local headquarters, of the loans not made by local banks, more than 62 percent of the number and 51 percent of the dollar value of the loans were made by banks with branches in the Philadelphia market (Figure 5, bottom two bars). Indeed, it appears that a local presence is important even for banks in the neighboring region. A loan made in Philadelphia by a bank from New York/North Jersey/Delaware is even more likely to have been made by a bank with a local branch than for nonlocal banks located farther away.

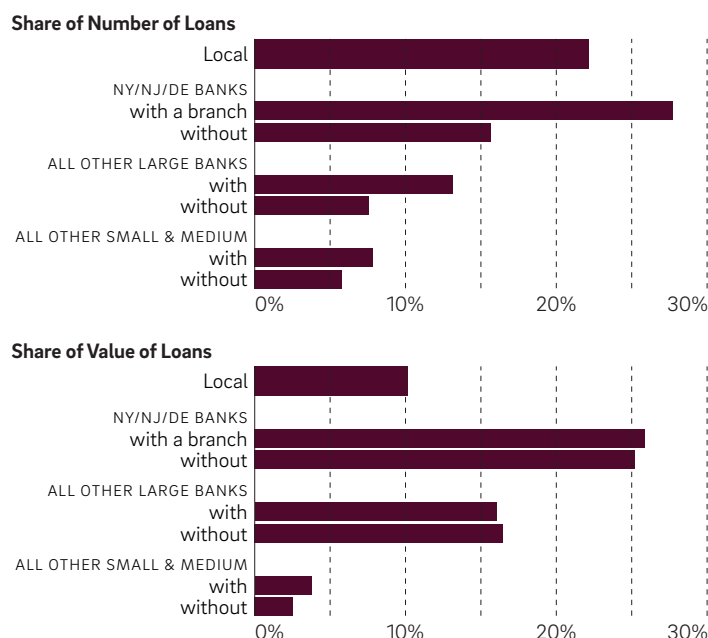
Note that nonlocal banks with branches in Philadelphia have a smaller dollar share of loans than their share of the number of loans. This suggests that a local presence is less important for larger real estate deals—that is, the market for large commercial real estate deals is larger and less localized. For larger loans, the originator's capacity to organize a lending syndicate or to securitize the loan may be more important than local knowledge or local ties.

Although local knowledge and local connections may give a local branch a competitive advantage in the Philadelphia market, there is an alternative explanation consistent with the data. Maintaining a local branch may indicate a nonlocal bank's commitment to the local market without actually facilitating the building of lending relationships. Regardless, the numbers

FIGURE 7

A Local Branch or a Location in a Nearby State Helps Nonlocal Banks Compete

Number and value of CRE loans in Philadelphia lending market, by lender category, 2017



Source: Real Capital Analytics, Inc. <https://www.rcanalytics.com/>.

suggest that a nonlocal branch may be a substitute for having a local headquarters.

If we view all banks in nearby regions or with local branches as having a Philly presence, we account for 83 percent of the volume and 79 percent of the dollar value of all loans not made by local banks. One reason for the large shares of both adjacent-area banks and banks with local branches is that the states in the area were early adopters of liberal branching and interstate banking laws.

See *Intrastate and Interstate Banking in and Near Philadelphia* 

What Does All of This Tell Us About CRE Lending in Philadelphia?

Figure 7 summarizes the structure of CRE lending in Philadelphia.

First, locally headquartered institutions play a relatively minor role in the market.


Second, one important reason for this is that these institutions are relatively small: Large nonlocal banks account for 73 percent

of the total value of loans not made by local banks, and they dominate the market for larger loans.

Third, having a branch in the Philadelphia market appears to be an acceptable substitute for having a local headquarters, and institutions that have branches here account for the bulk of nonlocal lending.

Fourth, proximity to the market is also important, with or without a local branch. Institutions from Delaware, northern New Jersey, and New York City and its environs account for a substantial part of the rest of the market.

A history of relatively liberal intrastate and interstate banking laws is a strong contributing factor to both the small size of Philadelphia banks and the strength in the local CRE market of banks from outside the Philadelphia market.

Finally, loans made by banks without local branches tend to be much larger. For these loans, the relationship benefits of proximity may be less important than other competitive advantages—for example, the ability to line up a syndicate of lenders to finance shares of the loan or the capacity to securitize the loan. 

Intrastate and Interstate Banking in and Near Philadelphia

In 1994 Congress passed the Riegle-Neal Interstate Banking and Branching Efficiency Act (IBBEA), allowing banks to merge and branch across state lines. The law went into effect in 1997. However, even before the IBBEA, many states were already permitting some form of interstate banking, most commonly through reciprocity agreements, whereby two states would agree to allow their banks to merge across state lines. These agreements were usually regional, focusing, for example, on New England or the Southeast.

In much of the nation, and until the 1980s, states imposed restrictions on banks' ability to compete in markets within the state but outside their local market—so-called intrastate banking restrictions. All of the states in the tristate region have a history of relatively liberal intrastate and interstate banking laws.

Delaware, with only three counties, adopted statewide branching in 1921 and never limited multibank holding companies. It was also an early adopter of interstate banking, albeit in an unusual way. In 1981 Delaware allowed out-of-state bank holding companies (BHCs) to set up de novo, limited-purpose banking subsidiaries. However, these subsidiaries were prohibited from competing with Delaware banks. In practice, three kinds of institutions were established: credit card banks (which offered only credit card loans and large certificates of deposit), wholesale banks (which catered only to large corporate customers), and back office operations (which operated usually in tandem with a credit card or wholesale operation). In 1988 Delaware allowed BHCs headquartered in the District of Columbia, Maryland, New Jersey, Ohio, and Pennsylvania to acquire existing Delaware banks on a reciprocal basis. In 1990 this law was expanded to include the entire country. Then in 1995 the reciprocity requirement was dropped.

New Jersey gradually adopted statewide branching throughout the 1970s, removing the last restrictions in 1983. By then it was moot, as multibank holding companies were permitted beginning in 1968.

New Jersey went the reciprocity route with interstate banking. In 1986 New Jersey allowed reciprocal acquisitions with Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, Missouri, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, Wisconsin, and the District of Columbia. In 1988 it instituted national reciprocity, which was dropped after the IBBEA was passed.

New York has had the most liberal laws. It gradually adopted full statewide branching between 1961 and 1976. It also removed all restrictions on multibank holding companies in 1976. It adopted national reciprocal interstate banking in 1982, national reciprocal interstate branching in 1993, and full national interstate banking in 1995.

Pennsylvania was the most restrictive of the three states, although it was still fairly liberal relative to many states. Until 1982, branching and merging were restricted to banks in contiguous counties. In 1982 this was changed to bicontiguous counties, that is, two counties away from a bank's headquarters county. Not until 1990 was this changed to full statewide branching. Likewise, multibank holding companies were prohibited until 1982, after which BHCs were allowed to own up to four banks. This was expanded to eight banks in 1986, and the limit was dropped in 1990.

On interstate banking, Pennsylvania adopted a reciprocal law in 1986 allowing acquisitions with banks in Delaware, Kentucky, Maryland, New Jersey, Ohio, Virginia, West Virginia, and the District of Columbia. This was changed to national reciprocity in 1990, and then full nationwide banking in 1995.¹²

Notes

1 Here, small banks are organizations (either stand-alone banks or bank financial holding companies [FHCs]) with less than \$10 billion in assets in 2010 dollars; medium-sized banks are those with total assets between \$10 and \$50 billion; and large organizations are those with total assets greater than \$50 billion, plus several large foreign-based banks whose U.S. presence may be relatively small.

2 See DiSalvo and Johnston (2016).

3 My study's local market is similar to the banking market as defined by regulators for antitrust purposes. We both define the local banking market largely by commuting patterns. In my study, the Philadelphia market comprises Burlington, Camden, Cumberland, Gloucester, Mercer, and Salem counties in New Jersey plus Bucks, Chester, Delaware, Montgomery, and Philadelphia counties in Pennsylvania. Regulators, by contrast, include only parts of Burlington and Mercer counties. I include whole counties both for simplicity's sake and because the banking market includes the majority of the population and the entire urbanized area of both counties. For further explanation, see DiSalvo (2014).

4 Our primary data come from Real Capital Analytics. Its definition of banks encompasses any depository institution, including commercial banks, savings banks, savings and loan associations, and credit unions.

5 It is possible (but not likely) that local banks' low share of local CRE originations is a more general phenomenon; that is, it is possible that the market for CRE loans is significantly larger than our standard measures of the local banking market. Carrying out this exercise for the Philadelphia market required hand-matching of the majority of deals, using local knowledge of the banks operating in the local banking market, as described in A Note on the Data. Without local knowledge of other banking markets, this type of hand match would be infeasible.

6 See DiSalvo and Johnston (2015).

7 Even at its largest, CoreStates was only the 21st-largest bank in the country.

8 A large bank is the same as defined above. The others in Figure 5 are small and medium-sized nonlocal banks.

9 The Federal Reserve Bank of New York defines the Metro New York/ North Jersey banking market as Fairfield, Litchfield, and New Haven counties in Connecticut; Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, and Union counties in New Jersey; Bronx, Columbia, Dutchess, Greene, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, and Westchester counties in New York; and Monroe, Pike, and Wayne counties in Pennsylvania. As in the Philadelphia market, we used whole counties even though the New York Fed includes only parts of some of these counties. As noted above, we assigned to the Philadelphia market counties that are shared between New York and Philadelphia. Delaware banks are defined as any bank or parent BHC/FHC headquartered in the State of Delaware.

10 Although there are no estimates for the distance between CRE borrowers and banks, there is a substantial literature measuring the distance between small-business borrowers and their banks. For example, Kenneth Brevoort and Timothy Hannan found that small businesses in nine metro areas were located between 2 and 5 miles from one of their lender's branches. Other studies have found that the median distance from small-business borrowers to their lenders is less than 10 miles.

11 There were only three such deals, so it is unlikely that dropping these deals creates a selection bias.

12 For further information on state branching and interstate banking laws, see Amel (1993) and Jayaratne and Strahan (1997).

References

- Amel, Dean F. "State Laws Affecting the Geographic Expansion of Commercial Banks," Board of Governors Working Paper (1993). <https://fraser.stlouisfed.org/title/4954>.
- Brevoort, Kenneth, and Timothy Hannan. "Commercial Lending and Distance: Evidence from Community Reinvestment Act Data," *Journal of Money, Credit and Banking*, 38:8 (2006), pp. 1991–2012.
- DiSalvo, James. "Third District Banking Market Definitions: 2014 Revisions," Federal Reserve Bank of Philadelphia (2014), https://www.philadelphiafed.org/-/media/research-and-data/banking/third-district-markets/banking-market-definitions_2014-revisions.pdf?la=en.
- DiSalvo, James, and Ryan Johnston. "Banking Trends: How Our Region Differs," Federal Reserve Bank of Philadelphia *Economic Insights* (Third Quarter 2015), pp. 16–22. https://www.philadelphiafed.org/-/media/research-and-data/publications/banking-trends/2015/bt-how_our_region_differs.pdf?la=en.
- DiSalvo, James, and Ryan Johnston. "Banking Trends: The Growing Role of CRE Lending," Federal Reserve Bank of Philadelphia *Economic Insights* (Third Quarter, 2016), pp. 15–21. https://www.philadelphiafed.org/-/media/research-and-data/publications/banking-trends/2016/bt-cre_lending.pdf?la=en.
- Jayaratne, Jith, and Philip E. Strahan. "The Benefits of Branching Deregulation," Federal Reserve Bank of New York *Economic Policy Review* (December 1997).

Research Update

These papers by Philadelphia Fed economists, analysts, and visiting scholars represent preliminary research that is being circulated for discussion purposes.

The views expressed in these papers are solely those of the authors and should not be interpreted as reflecting the views of the Federal Reserve Bank of Philadelphia or Federal Reserve System.

A Survey of Fintech Research and Policy Discussion

The intersection of finance and technology, known as fintech, has resulted in the dramatic growth of innovations and has changed the entire financial landscape. While fintech has a critical role to play in democratizing credit access to the unbanked and thin-file consumers around the globe, those consumers who are currently well served also turn to fintech for faster services and greater transparency. Fintech, particularly the blockchain, has the potential to be disruptive to financial systems and intermediation. Our aim in this paper is to provide a comprehensive fintech literature survey with relevant research studies and policy discussion around the various aspects of fintech. The topics include marketplace and peer-to-peer lending, credit scoring, alternative data, distributed ledger technologies, blockchain, smart contracts, cryptocurrencies and initial coin offerings, central bank digital currency, robo-advising, quantitative investment and trading strategies, cybersecurity, identity theft, cloud computing, use of big data and artificial intelligence and machine learning, identity and fraud detection, anti-money laundering, Know Your Customers, natural language processing, regtech, insuretech, sandboxes, and fintech regulations.

WP 20-21. Franklin Allen, Imperial College London; Xian Gu, Central University of Finance and Economics and the University of Pennsylvania; Julapa Jagtiani, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department.

Forecasting Consumption Spending Using Credit Bureau Data

This paper considers whether the inclusion of information contained in consumer credit reports might improve the predictive accuracy of forecasting models for consumption spending. To investigate the usefulness of aggregate consumer credit information in forecasting consumption spending, this paper sets up a baseline forecasting model. Based on this model, a simulated real-time, out-of-sample exercise is conducted to forecast one-quarter-ahead consumption spending. The exercise is run again after the addition of credit bureau variables to the model. Finally, a comparison is made to test whether the model using credit bureau data produces lower or higher root-mean-squared-forecast errors than the baseline model. Key features of the analysis include the use of real-time data, out-of-sample forecast tests, a strong parsimonious benchmark model, and data that span more than two business cycles. Our analysis reveals evidence that some credit bureau variables may be useful in improving forecasts of consumption spending in certain subperiods and for some categories of consumption spending, especially for services. Also, the use of credit bureau variables sometimes makes the forecasts significantly worse by adding noise into the forecasting models.

WP 20-22. Dean Croushore, University of Richmond and Federal Reserve Bank of Philadelphia Consumer Finance Institute Visiting Scholar; Stephanie Wilshusen, Federal Reserve Bank of Philadelphia Consumer Finance Institute.

The Cyclicalities of Labor Force Participation Flows: The Role of Labor Supply Elasticities and Wage Rigidity

Using a representative-household search and matching model with endogenous labor force participation, we study the cyclicalities of labor market transition rates between employment, unemployment, and nonparticipation. When interpreted through the lens of the model, the behavior of transition rates implies that the participation margin is strongly countercyclical: The household's incentive to send more workers to the labor force falls in expansions. We identify two key channels through which the model delivers this result: (i) the procyclical values of nonmarket activities and (ii) wage rigidity. The smaller the value of the extensive-margin labor supply elasticity is, the stronger the first channel is. Wage rigidity helps because it mitigates increases in the return to market work during expansions. Our estimated model replicates remarkably well the behavior of transition rates between the three labor market states and thus the stocks, once these two features are in place.

Supersedes Working Paper 19-03.

WP 20-23. Isabel Cairó, Board of Governors of the Federal Reserve System; Shigeru Fujita, Federal Reserve Bank of Philadelphia Research Department; Camilo Morales-Jiménez, Board of Governors of the Federal Reserve System.

Rational Inattention via Ignorance Equivalence

We present a novel approach to finite rational inattention (RI) models based on the ignorance equivalent, a fictitious action with state-dependent payoffs that effectively summarizes the optimal learning and conditional choices. The ignorance equivalent allows us to recast the RI problem as a standard expected utility maximization over an augmented choice set called the learning-proof menu, yielding new insights regarding the behavioral implications of RI, in particular as new actions are added to the menu. Our geometric approach is also well suited to numerical methods, outperforming existing techniques in terms of both speed and accuracy, and offering robust predictions on the most frequently implemented actions.

WP 20-24. Roc Armenter, Federal Reserve Bank of Philadelphia Research Department; Michèle Müller-Ippen, University of Notre Dame; Zachary R. Stangebye, University of Notre Dame.

Identification Through Sparsity in Factor Models

Factor models are generally subject to a rotational indeterminacy, meaning that individual factors are only identified up to a rotation. In the presence of local factors, which only affect a subset of the outcomes, we show that the implied sparsity of the loading matrix can be used to solve this rotational indeterminacy. We further prove that a rotation criterion based on the ℓ_1 -norm of the loading matrix can be used to achieve identification even under approximate sparsity in the loading matrix. This enables us to consistently estimate individual factors, and to interpret them as structural objects. Monte Carlo simulations suggest that our criterion performs better than widely used heuristics, and we find strong evidence for the presence of local factors in financial and macroeconomic datasets.

WP 20-25. Simon Freyaldenhoven, Federal Reserve Bank of Philadelphia Research Department.

Real-Time Forecasting with a (Standard) Mixed-Frequency VAR During a Pandemic

In this paper we resuscitate the mixed-frequency vector autoregression (MF-VAR) developed in Schorfheide and Song (2015) to generate real-time macroeconomic forecasts for the U.S. during the COVID-19 pandemic. The model combines 11 time series observed at two frequencies: quarterly and monthly. We deliberately do not modify the model specification in view of the recession induced by the COVID-19 outbreak. We find that forecasts based on a precrisis estimate of the VAR using data up until the end of 2019 appear to be more stable and reasonable than forecasts based on a sequence of recursive estimates that include the most recent observations. Overall, the MF-VAR outlook is quite pessimistic. The estimated MF-VAR implies that level variables are highly persistent, which means that the COVID-19 shock generates a long-lasting reduction in real activity. Regularly updated forecasts are available at www.donghosong.com/.

WP 20-26. Frank Schorfheide, University of Pennsylvania, CEPR, NBER, PIER, and Visiting Scholar, Federal Reserve Bank of Philadelphia Research Department; Dongho Song, Johns Hopkins University Carey Business School.

Labor Supply Within the Firm

There is substantial variation in working time even within employer-employee matches, and yet estimates of the Frisch elasticity of labor supply can be near zero. This paper proposes a tractable theory of earnings and working time to interpret these observations. Production complementarities attenuate the response of working time to idiosyncratic, or worker-specific, shocks, but firmwide shocks are mediated by preference parameters. The model can be identified using firm-worker matched data, revealing a Frisch elasticity of around 0.5. A quasi-experimental approach that mimics the design of earlier studies by exploiting only idiosyncratic variation would find an elasticity less than half this.

WP 20-27. Michele Battisti, University of Glasgow; Ryan Michaels, Federal Reserve Bank of Philadelphia Research Department; Choonsung Park, Korea Institute of Finance.

Vacancy Chains

Replacement hiring—recruitment that seeks to replace positions vacated by workers who quit—plays a central role in establishment dynamics. We document this phenomenon using rich microdata on U.S. establishments, which frequently report no net change in their employment, often for years at a time, despite facing substantial gross turnover in the form of quits. We propose a model in which replacement hiring is driven by the presence of a putty-clay friction in the production structure of establishments. Replacement hiring induces a novel positive feedback channel through which an initial rise in vacancy posting induces still more vacancy posting to replace employees who are poached. This vacancy chain in turn induces volatile responses of vacancies, and thereby unemployment, to cyclical shocks.

WP 20-28. Michael W.L. Elsby, University of Edinburgh; Ryan Michaels, Federal Reserve Bank of Philadelphia Research Department; David Ratner, Board of Governors of the Federal Reserve System.

The Firm Size and Leverage Relationship and Its Implications for Entry and Business Concentration

Larger firms (by sales or employment) have higher leverage. This pattern is explained using a model in which firms produce multiple varieties and borrow with the option to default against their future cash flow. A variety can die with a constant probability, implying that bigger firms (those with more varieties) have a lower coefficient of variation of sales and higher leverage. A lower risk-free rate benefits bigger firms more as they are able to lever more and existing firms buy more of the new varieties arriving into the economy. This leads to lower startup rates and greater concentration of sales.

Supersedes Working Paper 19-18.

WP 20-29. Satyajit Chatterjee, Federal Reserve Bank of Philadelphia Research Department; Burcu Eyigungor, Federal Reserve Bank of Philadelphia Research Department.

Bank Stress Test Results and Their Impact on Consumer Credit Markets

Using Federal Reserve (Fed) confidential stress test data, we exploit the gap between the Fed and bank capital projections as an exogenous shock to banks and analyze how this shock is transmitted to consumer credit markets. First, we document that banks in the 90th percentile of the capital gap reduce their new supply of risky credit by 13 percent compared with those in the 10th percentile and cut their overall credit card risk exposure on an annual basis. Next, we show that these banks find alternative ways to remain competitive and attract customers by lowering interest rates and offering more rewards and promotions to select groups of borrowers. Finally, we show that consumers at banks with a gap increase their credit card spending and debt payoff and at the same time experience fewer delinquencies. We also show that our results are generalizable to other lending products, such as mortgages and home equity. Overall, our results demonstrate a positive feedback loop among credit supply, credit usage, and credit performance due to the stress tests.

WP 20-30. Sumit Agarwal, National University of Singapore; Xudong An, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department; Larry Cordell, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department; Raluca A. Roman, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department.

Probability Forecast Combination via Entropy Regularized Wasserstein Distance

We propose probability and density forecast combination methods that are defined using the entropy regularized Wasserstein distance. First, we provide a theoretical characterization of the combined density forecast based on the regularized Wasserstein distance under the Gaussian assumption. Second, we show how this type of regularization can improve the predictive power of the resulting combined density. Third, we provide a method for choosing the tuning parameter that governs the strength of regularization. Lastly, we apply our proposed method to the U.S. inflation rate density forecasting, and illustrate how the entropy regularization can improve the quality of predictive density relative to its unregularized counterpart.

WP 20-31 Revised. Ryan Cumings-Menon, U.S. Census Bureau; Minchul Shin, Federal Reserve Bank of Philadelphia Research Department.

The Credit Card Act and Consumer Debt Structure

We investigate whether the Credit Card Accountability, Responsibility, and Disclosure (CARD) Act of 2009 influenced the debt structure of consumers. By debt structure, we mean the proportion of total available credit from credit cards for each consumer. The act enhances disclosures of contractual and related information and restricts card issuers' ability to raise interest rates or charge late or over-limit fees, primarily affecting nonprime borrowers. Using the credit history via the Federal Reserve Bank of New York/Equifax Consumer Credit Panel during 2006–2016, we find that the average ratio of credit limit on cards to total consumer debt declined for nonprime borrowers in comparison to prime borrowers after the introduction of the CARD Act. The decline did not occur before the bill was first introduced in Congress; it took place afterward and continued through the end of our sample period. The results suggest that the CARD Act likely had an adverse effect on nonprime borrowers.

WP 20-32. Yiwei Dou, New York University; Julapa Jagtiani, Federal Reserve Bank of Philadelphia; Joshua Ronen, New York University; Raman Quinn Maingi, New York University.

Financial Consequences of Identity Theft

We examine how a negative shock from identity theft affects consumer credit market behavior. We show that the immediate effects of fraud on credit files are typically negative, small, and transitory. After those immediate effects fade, identity theft victims experience persistent increases in credit scores and declines in reported delinquencies, with a significant proportion of affected consumers transitioning from subprime-to-prime credit scores. Those consumers take advantage of their improved creditworthiness to obtain additional credit, including auto loans and mortgages. Despite having larger balances, these individuals default on their loans less than prior to identity theft.

Supersedes Working Paper 19-02.

WP 20-33. Nathan Blascak, Federal Reserve Bank of Philadelphia Consumer Finance Institute; Julia Cheney, Federal Reserve Bank of Philadelphia Consumer Finance Institute; Robert Hunt, Federal Reserve Bank of Philadelphia Consumer Finance Institute; Vyacheslav Mikhed, Federal Reserve Bank of Philadelphia Consumer Finance Institute; Dubravka Ritter, Federal Reserve Bank of Philadelphia Consumer Finance Institute; Michael Vogan, Ally Bank.

A World Without Borders Revisited: The Impact of Online Sales Tax Collection on Shopping and Search

I study the effect of closing the online sales tax loophole on online spending and search. Using online shopping data, sales taxes, and Amazon's staggered sales tax collection, I estimate that household price elasticity is -1.9 , implying a 13 percent decline in Amazon's revenues upon sales tax collection. After Amazon collects sales taxes, households increase their spending on Amazon's taxed competitors, but not its untaxed competitors. I find no evidence that households change their browsing or shift their spending offline. Collecting sales taxes online will help governments recapture lost taxes and increase online competition, but will not shift customers back offline.

WP 20-34. Mallick Hossain, Federal Reserve Bank of Philadelphia.

Q&A...

with Wenli Li, a senior economic advisor and economist here at the Philadelphia Fed.



Wenli Li

Wenli Li grew up in southeast China. After graduating from Tsinghua University in Beijing in 1990, she relocated to the United States, earning her doctorate in economics from the University of Minnesota in 1997. Since then, she has worked for the Federal Reserve System, first at the Richmond Fed, then at the Board of Governors, and then, since 2003, here at the Philadelphia Fed. Her specialty is consumer finance, especially bankruptcies and mortgages.

You graduated in 1990 from Tsinghua University, one of China's premier schools. What drew you to study management information systems there?

In China, at least when I was growing up, when you got into high school, you were put into one of two tracks, liberal arts or technical. I was in the technical track. I liked it, but I wanted to analyze social issues, to understand what China was going through at that time. The country had just begun to introduce a market economy. Tsinghua had been a school for engineering. Then in the '80s, when the country was opening up, they built a few more schools and departments. The School of Management and Information was the new thing, and I liked it. China didn't really have economics programs for a long time, because it was a planned economy. Among the schools I was interested in, Tsinghua was one of the few with these interdisciplinary majors.

What led you to attend the University of Minnesota after graduation?

At the time we didn't know much about the U.S., but Minnesota had some connections with China. At Tsinghua, I had met a teacher of English from Minnesota, and I had friends who had moved there, so I applied.

What was it like moving to America?

I had a good time. I lived in a house with 10 girls from nine countries. My first year, there was a big snowstorm and the school closed for two weeks. Seeing that amount of snow, and not realizing that that would recur every year, we were so excited. I didn't have any trouble adjusting to the culture. I met some of my best friends there during my first year.

Since 2003, you've focused on consumer finance. What are some of the key lessons you've learned about consumer finance in America?

The U.S. is very different from many countries. The U.S. has one of the highest homeownership rates among the developed economies. And it's not entirely due to affluence. A lot of it has to do with government policy promoting homeownership. Fannie Mae, Freddie Mac, the

whole secondary market was built by the government to encourage homeownership. And the U.S. is perhaps the only country that has a loan mortgage contract that lasts 30 years. Elsewhere you can't imagine lending to anybody for more than 10 years. The U.S. is also very sophisticated in using the bankruptcy system to deal with defaults. A lot of developing countries didn't have that for a long time. So the U.S. has a more sophisticated bankruptcy system, dealing with both personal and business bankruptcies.

In the article you wrote for this issue, you note that bankruptcy can be a good thing for a person or firm. Why wouldn't somebody file for bankruptcy when it's in their best interest?

In the case of an individual, there are consequences associated with filing for bankruptcy. You cannot file again for a number of years. And your credit file will have a flag, so all of your potential future lenders would see that. People who are less certain about their future may be reluctant to file. For businesses, uncertainty can be an even bigger issue, because you worry about whatever may happen that can affect your business future. And in a lot of the small businesses, it's like your baby, you put all your effort and money into that business, and that could make it a hard decision.

In your article, you write about how COVID may affect bankruptcy courts. How might it also affect the housing market?

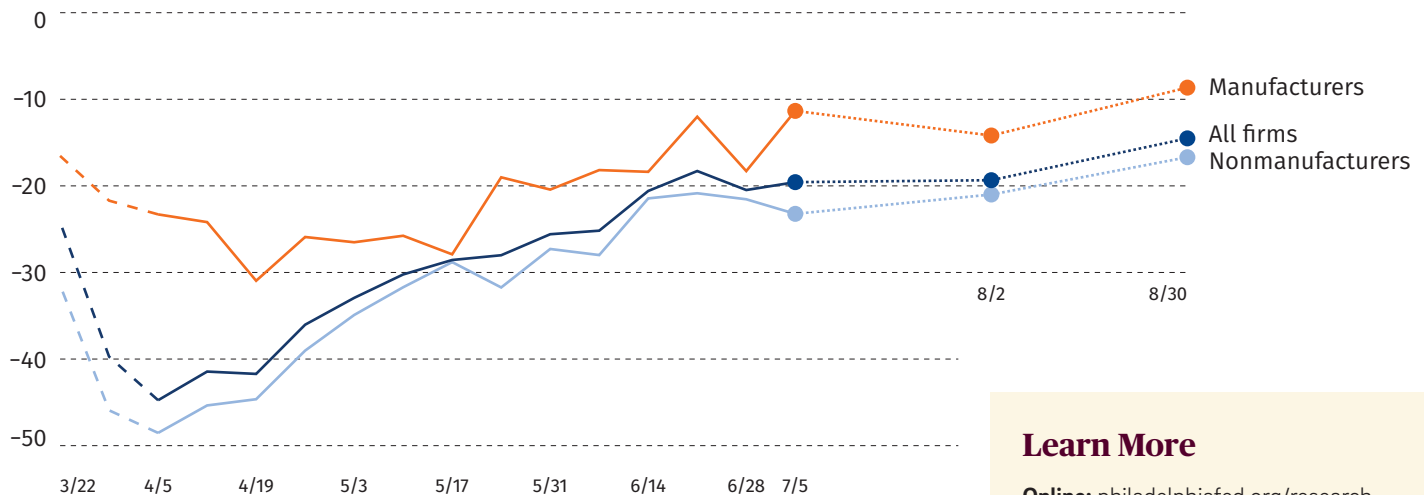
A lot of us are going to start working remotely, which means that having more living space is becoming more important. Until the Great Recession, housing had been booming for so long, and so spectacularly, there were mega-houses being built, and a lot of us bought more space than we needed. After that crisis there was uncertainty in both job income and house prices, so there was a wave of downsizing to small houses and moving to the cities. And now with this pandemic and new work style, people will realize there is still value in having a bigger house in the suburbs, especially close to a big city. ■

Data in Focus

COVID-19 Business Outlook Survey

The Philadelphia Fed collects, analyzes, and shares useful data about the Third District and beyond. Here's one example.

Weekly New Orders Relative to Expectations



Note: The average percent change (above) is estimated using the midpoints of the ranges of each answer option. Dashed lines leading up to April 5 indicate sample size changes over the first two weeks. Beginning on July 5, the survey frequency changed from weekly to monthly; dotted lines indicate the average weekly trend between the July 5 and August 30 surveys.

Source: Federal Reserve Bank of Philadelphia

Learn More

Online: philadelphiafed.org/research-and-data/regional-economy/covid19-economic-impacts

E-mail: Elif.Sen@phil.frb.org

We have long conducted monthly and quarterly Business Outlook Surveys, but the speed and severity of the COVID-19 crisis prompted us to create a new weekly survey in March.


In each COVID Survey, we asked respondents to compare the previous week's new orders or sales with what they had expected prior to the pandemic. For the first 12 weeks, we also asked what actions they had taken in response to the pan-

demic. In weeks 13 through 16, we asked about specific changes they had made to their labor force.

We also asked, on a rotating four-week basis, questions about the influence of different factors on new orders or sales, concerns about credit issues, and sources and utilization of financial assistance.

We found that Third District firms experienced strong declines in new orders and sales throughout the spring, but sur-

vey results suggest some stabilization and a slight improvement despite continued overall declines as summer approached. However, respondents continued to note difficulties, confusion, and uncertainty.

After collecting 16 weeks of survey data through early July, we reduced the survey's frequency to monthly but continue to track many of the same questions. The pandemic's impact will be felt for some time to come. 



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