

DISCUSSION PAPER SERIES

IZA DP No. 13808

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Succeeded?**

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ABSTRACT

Has the Paycheck Protection Program Succeeded?*

Enacted March 27, 2020, the Paycheck Protection Program (PPP) was the most ambitious and creative fiscal policy response to the Pandemic Recession in the United States. PPP offers forgivable loans — essentially grants — to businesses with 500 or fewer employees that meet certain requirements. In this paper, we present evidence that PPP has substantially increased the employment, financial health, and survival of small businesses, using data from the Dun & Bradstreet Corporation. We use event studies and standard difference-in-difference models to estimate the effect of a small business applying for larger PPP loans and of a small business being eligible for PPP based on size. While our findings are informative, we believe it is too early to issue conclusive judgment on PPP's success. We offer lessons for the future from the PPP experience thus far.

JEL Classification: H20, H25, H32, J01, J08, J23

Keywords: Paycheck Protection Program, PPP, Pandemic Recession, CARES Act, COVID-19

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1. Introduction

The Paycheck Protection Program was the most ambitious and creative — and, potentially, the most important — fiscal policy response to the Pandemic Recession in the United States. With a \$669 billion budget, the program is the largest single component of the nation’s fiscal policy response to the crisis, and by itself approaches the total amount spent by Congress on the 2009 Recovery Act response to the Great Recession.

It was enacted on March 27, 2020, as part of the Coronavirus Aid, Relief, and Economic Security (CARES) Act, the \$1.8-trillion “Phase 3” response to the pandemic crisis. An entirely new program, it began issuing loans seven days later, on April 3. It offers forgivable loans — essentially, grants — to businesses with 500 or fewer employees that meet certain requirements, including maintaining employment at pre-pandemic levels.

Has it succeeded? In this paper, we present evidence that PPP has substantially increased the employment, financial health, and survival of small businesses. In addition, we find that the effect of PPP on small business outcomes is increasing over time, with larger effects in August than in April or May. We also find some evidence to suggest that PPP was most effective for relatively smaller firms. We use data from the Dun & Bradstreet Corporation for our analysis, employing standard difference-in-difference models to estimate the effects of a small business applying for a PPP loan of greater than \$150,000 (we only observe PPP applications for loans of that size) and of a small business being eligible for PPP based on size, and using event studies to trace the dynamic effects of PPP.

Despite this finding, our ultimate conclusion is that it is too early to issue any definitive judgment on PPP’s success. The program had important short-run goals, to be sure. These include supporting employment and replacing worker wages, maintaining worker-firm attachments, boosting consumer spending, and ensuring small business continuity during the shutdown. But the program had important medium-run goals, as well, including preventing a wave of bankruptcies once the economy partially reopened, increasing productivity by preserving firm-specific human capital, worker-firm matches, and networks, and helping the economy recover faster by keeping workers off the unemployment rolls. Our data run through August, and we cannot adequately investigate any of these outcomes. The effects of PPP are unfolding, and it will be particularly important to see what happens to businesses that received PPP and the workers they employ once they have exhausted their forgivable loan.

PPP is a novel program, and many standard intuitions about fiscal policy do not apply to it. It was not a stimulus program in the sense that its purpose was not to ‘stimulate’ the economy; that is, it is not a program calling for a measure of the multiplier. Instead, its purpose was to preserve the productive capacity of the small-business sector and to shorten the transition to a new, post-virus equilibrium by supporting labor demand over the medium term, allowing for a more rapid economic recovery. It was not a jobs program in the sense that its goal was not exclusively to preserve employment. Instead, its goals were to maintain worker-firm attachments, particularly during the shutdown, and to ensure small business continuity. It intentionally did not attempt to exclude inframarginal recipients because the unique circumstances under which it was enacted made this impractical. In the early days of the shutdown, how could the government have known which firms were inframarginal? And given the numerous goals of the program, it’s not clear how ‘marginal’ would be defined in this context. These design features affect intuitive measures of ‘cost per job saved,’ as we describe later.

In this paper, we discuss the need for, goals of, and key design features in a small business revenue replacement program (Section 3). We then describe PPP, and contrast select features of the program to what we view as the best design (Section 4). We discuss the program’s implementation challenges — extensively covered in the press — and offer qualitative analysis of PPP (Section 5). In Section 6, we present our empirical analysis of PPP. In Section 7, we offer a retrospective and discuss lessons for the future.

2. The Pandemic Recession and Potential Policy Responses

The Pandemic Recession is remarkable in both its suddenness and depth. In the week ending March 14, 2020, there were 282,000 initial claims for unemployment insurance benefits, about one-third higher than the average number of new claims over the preceding three months. The next week, there were 3.3 million initial claims, shattering the previous record of 695,000 new claims, set in October 1982. The week after that, ending on March 28, there were 6.9 million initial claims. At the time of this writing, there are still well over 800,000 new claims each week.

The unemployment rate in February 2020 was 3.5 percent. In March, the first month of the Pandemic Recession, it stood at 4.4 percent. In April, it hit its peak of 14.7 percent, the

highest rate since the Great Depression.¹ In two months, the official unemployment rate increased by a factor of four. For comparison, during the Great Recession it took nearly two years for the unemployment rate to double, from five percent when the recession began in December 2007 to its peak of 10 percent in October 2009.²

The pandemic's economic devastation extended beyond the labor market. Real GDP contracted at a 31.4 percent annual rate in the second quarter of 2020. Using the same measure, the worst quarter in the Great Recession saw an 8.4 percent decline, and the only quarter since the Great Depression to register a double-digit contraction was 1958 Q1, at 10 percent. Relative to the same quarter one year prior, 2020 Q1 real GDP contracted by nine percent. The peak contraction using this metric in the Great Recession was 2008 Q3's 3.9 percent.

Some of the ways policy needed to respond to this unprecedented economic crisis were relatively straightforward. The Federal Reserve needed to support the economy and to ensure liquidity and smooth functioning in financial markets. Social insurance and safety net programs needed to be strengthened, and their gaps needed to be plugged. Large businesses, with diversified revenue streams and access to capital markets, could be supported with lending programs.

But policy to support small and mid-size businesses was harder to formulate. The need for a prolonged shutdown made interruption loans for such businesses inadequate, and even with a more conventional loan many businesses would likely not be able to survive. Firms needed more *equity* to shore up weakening balance sheets and replace lost cash flows and many businesses would not be interested in adding to debt burdens in any case. Equity injections were not implementable for many firms of this size, and operationalizing a program based on them would be extremely difficult to do in the time needed. The best available option was a revenue-replacement program for small business.

¹ The official unemployment rate reported by the Bureau of Labor Statistics for April 2020 was 14.7 percent. The household survey on which the unemployment rate is calculated showed a large increase in the number of respondents who were classified as employed but absent from work. Most of these responses should have been classified as unemployed on temporary layoff. Incorporating this change, the actual unemployment rate for April was likely 19.5 percent.

² For research on the labor market effects of the pandemic, see Bartik, *et al.* (2020), Coibion, *et al.* (2020), Goolsbee and Syverson (2020), and Kahn, *et al.* (2020).

3. A Small Business Revenue-Replacement Program³

The Pandemic Recession created the need for a revenue-replacement program for small businesses. In this section, we discuss that need. We argue that the goals of such a program should be twofold: to ensure small business continuity and prevent a cascade of small business failures, and to preserve existing employment relationships while shelter-in-place orders are in effect. We offer our view on some key program design features to achieve these goals. We also address moral hazard concerns, and briefly review programs enacted by other major economies.

3.1. *The need to replace small business revenue*

The pandemic itself can be thought of as a large shock to *aggregate supply*: Businesses could no longer produce goods and services because workers could not safely go to work. The inability of workers to work caused downstream supply chain disruptions, as well.

Shelter-in-place orders ameliorated the supply shock by reducing the spread of the coronavirus. The catch is that these policies led to a precipitous drop in aggregate demand, including labor demand (Kahn, *et al.*, 2020) as businesses were temporarily closed and workers lost jobs, faced hours reductions, and experienced nominal wage cuts (Cajner, *et al.*, 2020). In the private economy, workers faced a large reduction in earned income and businesses lost revenue.

The sharp and sudden nature of the Pandemic Recession left smaller services-sector firms particularly at risk. Unlike larger businesses, these firms could not readily access capital markets to shore up their balance sheets. Capital-market imperfections link equity contractions to business fluctuations, and these firms were particularly vulnerable to a lack of collateralizable net worth (*e.g.*, Gertler and Hubbard, 1989). Small and mid-size businesses generally do not have diversified revenue streams, as well. And they have limited cash holdings. Only half of small businesses hold cash reserves sufficient to cover 15 days, and only four in 10 have a three-week cash buffer (JP Morgan Chase Institute, 2019).

And unlike manufacturing firms, *services* businesses would not return to partial operations following the lockdowns with a backlog of orders. Nearly all of the revenue they lost during the lockdowns was lost *forever* — for example, diners did not eat twice as many meals in May and June because restaurants were shut in March and April.

³ This section draws on Hubbard and Strain (2020) and Strain (2020).

To summarize, the economy was at risk of a cascade of small business bankruptcies. Small businesses play a critical role in the economy. Firms with fewer than 500 employees account for 47 percent of private sector employees and 41 percent of private sector payroll. There are 30.7 million such businesses, 19 percent of which have paid employees (Small Business Administration, 2019). A wave of small business failures could have created an aggregate demand doom loop, in which declining incomes and employment opportunities reinforced each other.

One way to address this concern would have been to lift lockdown orders. But the public health effects of the virus and concern workers had about getting sick would have made this strategy both inadvisable and ineffective. The best option for the federal government in a short, temporary shutdown was to make up a large fraction of revenue businesses would have generated in normal times. We return later to the challenges posed by longer-term partial shutdowns.

3.2. Goals, cost, and key design features

The specific goals of such a program are to ensure small business continuity and prevent a wave of bankruptcies and, during the period of the shutdown, to preserve employment relationships. The overarching objective is to preserve as much of the productive capacity of the economy as possible while short-term shelter-in-place orders are in place, and to help the economy transition quickly to a new, post-shutdown equilibrium by supporting labor demand over the medium term.

For firms, preventing wasteful liquidations allows the black box of productive technologies and business relationships to remain intact. Professional networks are preserved, relationships with suppliers and customers are maintained, and knowledge of local conditions and preferences can continue to be put to productive use. For workers, the value of firm-specific human capital is maintained, and maintaining employment relationships means they continue to be paid by their employer, and they are in a position to return to work immediately once shelter-in-place orders are lifted. No separation takes place, even a temporary furlough of workers. For both workers and firms, productivity enhancing worker-firm matches are maintained. And the economy is in a position to snap back quickly because labor demand has been supported.⁴

⁴ Papers that discuss the role of worker-firm matches include Mortensen and Pissarides (1999) and Davis and von Wachter (2011). Jackson (2013) measures match quality directly in the context of schools, estimating teacher,

This observation is especially true in a lockdown because the risk of mass closures is so real. Without a program to support small business continuity, a wave of closures would be followed by a period in which new businesses started. Eventually, the economy would reach a new equilibrium. But during the transition, labor demand would be depressed because there would be fewer businesses looking for workers, which would lead to lengthy spells of unemployment for millions of workers and a slower and more sluggish recovery.

Because the (aggregate, present discounted value of) social benefits of these businesses exceeds their (aggregate, present discounted value of) costs, a subsidy is justified under standard economic logic. Particularly given the possibility of an aggregate demand doom loop and the lengthy period of high-unemployment it would cause, we argue that in the context of the pandemic, the appropriate revenue-replacement rate is large.

Once lockdown orders are lifted, partial revenue replacement may still be needed. But it is no longer necessary or economically desirable to compel firms to maintain pre-lockdown employment relationships or employment levels. After the economy has partially reopened, policy should not introduce frictions into the process of reallocating labor (and capital) to its post-lockdown most productive use, and policy should allow firms the flexibility to reorganize their post-lockdown production functions to further the key overall goal of a revenue-replacement program: ensuring small business continuity.

There is an inherent tension between a revenue-replacement program's goal of maintaining employment relationships and keeping firms in business and the goal of efficiently reallocating factor inputs and swiftly transitioning to a new, post-lockdown equilibrium. But for the reason we discussed earlier, there is less to this tension than meets the eye in this case. A revenue-replacement program allows that transition to happen faster by preserving many otherwise-viable firms during the shutdown. Once the economy has partially reopened, severing the link between program participation and maintain pre-virus employment levels is critical to minimizing this tension. And a revenue-replacement program should be of limited duration following the reopening of the economy. A revenue-replacement program may also keep some

school, and match productivity on student outcomes. He finds that teacher-school (worker-firm) match effects are important, estimating that a one standard deviation increase in match quality increases math scores by an amount roughly equal to two-thirds of the effect of a one standard deviation increase in teacher quality. Using linked worker-firm data, Farooq, Kugler, and Muratori (2020) document an important role for match quality, and find that more generous unemployment insurance benefits leads to higher quality matches. In our context, match quality likely matters the most for larger PPP-eligible firms.

business afloat that would have shut down in the absence of the pandemic. Presumably most businesses that were not viable prior to the pandemic will remain unviable once the revenue-replacement program has ended.

These considerations emphasize the need for the revenue-replacement program to focus on *revenue*, not simply on payroll costs. A separate reason to focus on revenue rather than narrowly focusing on payroll costs is that non-payroll expenses, like rent in many cities, are significant. A program replacing payroll costs, but not overall revenue, may not be sufficient to keep many businesses in high-rent cities from closing.

Replacing small business revenue is an expensive proposition. Hubbard and Strain (2020) estimate that replacing 80 percent of revenue for 12 weeks for service-sector businesses — that is, for businesses in industries other than manufacturing, finance and insurance, health care, and educational services — with fewer than 500 employees would cost \$1.2 trillion.

Expensive as such an intervention is, the counterfactual would be even costlier, with cascading business failures, wasteful liquidations, plunging incomes, soaring unemployment, and little prospect for a rapid recovery because of the devastating effects on the small business ecosystem. Another budgetary consideration is the offsetting effects of less use of social insurance programs, like Unemployment Insurance, and safety net programs, like food stamps.

So far, our discussion of a small business revenue-replacement program has been general, and could be applied to any situation in which small, services-sector businesses needed to shut down for a period of several weeks. A key feature of the Pandemic Recession is that such a program did not exist, and Congress needed to stand one up quickly. Given this context, it was best for Congress to rely on the existing relationships many small businesses have (via checking accounts or loans) with commercial banks rather than to have had the government attempt to stand up an entirely new direct transfer program.

The government should have treated the banks essentially as conduits to get money into business accounts as quickly as possible. Of course, such an approach requires convincing banks that they will be held harmless in the event of borrower misrepresentation, both by the current administration and by future administrations. Strong assurances are necessary.⁵

⁵ Prior to the 2008 financial crisis, large U.S. banks routinely made Federal Housing Administration (FHA) loans designed to help first-time home buyers and buyers with relatively poor credit purchase houses. To reach these borrowers, the government encouraged lax lending standards. This policy shift contributed to the housing bubble, and FHA's solvency was in question following the crash. The government imposed fines on banks, arguing they did

To align better with an equity infusion, the revenue-replacement grants should be structured as loans that are forgivable if certain conditions are met, and should be fully backed by the government, that way banks assume no risk. Banks should be allowed to charge fees, paid for by the government, as an incentive to participate and for administrative costs.

Forgivable loans (*i.e.*, grants) are necessary for the program to succeed. The pandemic shutdown's adverse consequences for firms' collateralizable net worth and cash flows require equity contributions. Loans, even with low interest rates and long maturities, would likely be insufficient given the need for equity financing. Services-sector businesses permanently lose revenue in a shutdown, and many would likely rather lay off workers than take on additional debt. Even if debt service could be deferred for a period of one or two years, many would be reluctant to take out a loan.⁶ These businesses often have low profit margins, and a loan program would likely have had an insufficient take-up rate to meet policymakers' objectives.⁷ If the only concerns were cash flow challenges and a lack of access to equity capital, then a lending program might be all that is justified. But as we argued above, the divergence between the private and social value of small-business continuity suggests that subsidies are justified using standard economic logic, particularly during the shutdown period. (In Section 7, we discuss how a lending program might compliment grants once the economy has partially reopened.)

A revenue-replacement program should be broad-based, and should avoid too much targeting. In the fog-of-war atmosphere of the pandemic, policymakers have limited knowledge of the virus's spread, and crafting an effective triggering mechanism based on public-health metrics is difficult. The government should avoid picking winners and losers by targeting the program on select industries.

Revenue tests or demonstrations of hardship should also be avoided. At the beginning of a sudden and unexpected lockdown, demonstrations significantly slow down the process of getting funds to businesses, putting the effectiveness of the program in jeopardy. Once the

not adhere to FHA underwriting standards. The revenues from the fines helped to shore up FHA. This episode has left many large banks skittish about using anything but strict underwriting standards as part of government lending programs.

⁶ For a proposal that argues in favor of lending programs, see Ozimek and Lettieri (2020). Hanson, *et al.* (2020a) argue for equity-like arrangements and grants to support small business. Hanson, *et al.* (2020b) argues for payment assistance to impacted businesses to meet recurring fixed obligations (*e.g.*, interest, rent, and utilities) during the health emergency.

⁷ At the time of this writing, the Federal Reserve's Main Street Lending Facility has very few loans, suggesting that even among mid-size business taking out debt under non-borrower-friendly terms is not an attractive prospect.

economy partially reopens, it can be argued that revenue tests target assistance on firms that need it most, as measured by revenue loss relative to normal circumstances. But forward-looking revenue tests serve as a disincentive to earn revenue by imposing implicit marginal tax rates on revenue. Backward-looking revenue tests avoid this disincentive, but are less generous to otherwise identical firms that are doing better adjusting to the post-lockdown economic circumstances.

The main appeal of revenue tests and hardship demonstrations are lower program costs and targeting aid based on “need.” The problem is that need is an amorphous concept in a partially reopened economy, and revenue tests bring their own problems. The best targeting strategy is broad-based, focusing on a large class of firms defined by size and industry type.

3.3. Addressing moral hazard concerns

A program that replaces revenue for small businesses for a period of time is an extraordinary government intervention in the private economy. It is reasonable to be concerned that such a program would lead to excessive risk taking or other imprudent behavior on the part of firms by potentially creating the perception of a government “business revenue safety net.”

In normal public programs under normal circumstances, this concern is certainly real. But in this instance, we are much less concerned about moral hazard. The need to shut down large segments of the economy will occur infrequently, and without advance notice. Businesses cannot purchase shutdown insurance from private firms in the way they can insure against risks from fires and floods. Government should communicate the extraordinary nature of the assistance is driven by the extraordinary nature of the threat. This step should mitigate moral hazard concerns.

3.4. Policy response in other OECD nations

Before turning to the Paycheck Protection Program, we briefly discuss programs enacted by member countries in the Organization for Economic Cooperation and Development (OECD) during the Pandemic Recession. See Table A1 for specific program descriptions and parameters for OECD countries.

Many European nations relied on a version of a wage subsidy scheme in which workers saw their hours and pay reduced and their government picked up a large part of the cost of employing them.⁸ This type of program was used by Germany (*Kuzarbeit*, or short-term work)

⁸ Hamilton and Veuger (2020) argue that large expenditures to address the pandemic will heighten concern about the public finances of some European Union member states, implying that a broader, European approach to fiscal policy

during the Great Recession, and is widely credited with keeping the German unemployment rate down during that period. The way it often worked was that firms paid the benefit to their workers, which was typically somewhat lower than wages, and the government reimbursed the firm (Blanchard, *et al.*, 2020). Austria implemented a similar program during the pandemic, replacing up to 90 percent of covered wages.

A few examples: In the United Kingdom, the government reimbursed firms for 80 percent of the wages of furloughed workers. Germany covered 60 percent of wages for childless workers on furlough and 67 percent for furloughed workers with children. Depending on the month, the government of France covered 84 percent, or 71 percent (as of June) of wages for workers on temporary layoff. Notably, these countries did not condition eligibility based on firm size, in contrast to the U.S. emphasis on small and mid-size firms. Some European economies conditioned subsidies on a demonstration of a significant decline in revenue (*e.g.*, the Netherlands, Estonia, and the Slovak Republic). Slovenia emphasized state-funded bonuses for ‘hazard pay’ in certain sectors.

These programs are similar to what we describe above. They maintain the worker-firm relationship during the shutdown period, making it easier for workers, firms, and the economy to recovery quickly once economic activity partially resumes. Keeping workers paid by the firms also allows government assistance to reach workers quickly. They are similar to standard unemployment insurance in that the government is helping support the incomes of workers who are underemployed, but unlike standard unemployment insurance, they allow for part-time work.

At the same time, European programs have been more focused on supporting workers in their current employment matches, rather than smoothing a transition toward different employment matches. Programs generally permitted workers receiving nonwork or part-time work benefits to remain attached to the firm. As with the U.S. Paycheck Protection Program, the state effectively assumed a portion of payroll costs for covered workers, albeit through payments made to firms.⁹ The U.S. program formally worked as a combination of loans and outright grants

is necessary. They suggest that the eurozone issue Eurobonds to placate markets and to avoid issues associated with sovereign debt overhang.

⁹ Norway relied on layoffs, making it easier for firms to use temporary layoffs and increasing the generosity of unemployment benefits for workers. Norway also instituted a new compensation scheme for businesses that subsidized fixed costs. Alstadsæter, *et al.* (2020) find that this program reduced firms’ economic distress by a similar magnitude to PPP by reducing the negative effects of the crisis on profitability, liquidity, debt, and solvency.

to firms and wage subsidies. As we describe later, a number of administrative challenges were ‘unforced errors’ in its implementation.

While some European pandemic unemployment or wage subsidy schemes have faced fewer administrative challenges than in the United States, they still raise concerns (to which we return later). Importantly, they were and are designed to maintain employment relationships in a temporary cyclical downturn (*e.g.*, a moderate and short recession or a short pandemic shutdown). In a ‘reopening’ of the economy, policy shifts would be needed to focus on rehiring workers and worker transitions by gradually reducing wage subsidies and the generosity of unemployment benefits.

Employment policy responses in OECD countries outside Europe during the pandemic have been varied. Canada, for example, focused on rehiring workers previously laid off due to the COVID-19 experience, with subsidies of up to 75 percent of all covered wages. Israel relied on relaxing requirements for unemployment benefits, direct and government-guaranteed loans to business of all size, special support for high-risk businesses, grants for small businesses, and a variety of measures to reduce the short-term burden of business taxes. Australia, like large European economies, implemented a wage subsidy for firms’ retention of employees. Japan financed wage subsidies for retained workers, but only for small and mid-sized firms. South Korea increased worker retention subsidies to up to 90 percent of covered wages for three months for all employers. A less generous subsidy to wages was provided in South Africa for firms whose operations were at least partially curtailed as a consequence of the COVID-19 pandemic. In Latin America, Chile provided partial support for wage declines, and Colombia assisted workers in firms with significant revenue declines with support of 40 percent of the minimum wage.

4. The Paycheck Protection Program

The Paycheck Protection Program (PPP) was created by the Coronavirus Aid, Relief, and Economic Security Act (CARES Act), the \$1.8-trillion “Phase 3” economic recovery package passed by Congress and signed into law on March 27, 2020. In this section, we outline the statutory design of PPP, the program’s implementation by the Department of the Treasury and Small Business Administration, and differences between PPP and the features of a small business revenue-replacement program we discussed in the previous section.

4.1. PPP's design

PPP is a forgivable loan program. Businesses or nonprofits with 500 or fewer employees; sole proprietors, independent contractors, or self-employed individuals; and small businesses, 501(c)(19) veterans organizations, or Tribal business concerns that otherwise meet SBA's size standards are eligible. Businesses in the accommodation and food services sector (NAICS code 72) may apply the 500-employee rule to each physical location, not to the corporation as a whole. Congress appropriated \$349 billion for PPP in the CARES Act.

Under the program, businesses can borrow up to 2.5 times their average monthly payroll costs, capped at \$10 million. Loans are issued by banks and are guaranteed by the government.¹⁰ The amount of the loan spent on payroll costs (including benefits), rent, utilities, and mortgage interest during the 24-week period (originally eight-week period) after the loan is originated is forgiven — *i.e.*, it is converted to a grant — provided that 60 percent (originally 75 percent) of the amount forgiven is spent on payroll (a Treasury/SBA regulation not found in the CARES Act) and the business does not reduce headcount relative to pre-crisis levels and does not reduce any employee's compensation by more than 25 percent of his or her pre-crisis level. If headcount or compensation are reduced beyond those parameters, the amount of the loan forgiven may be reduced proportionately under some (but not all) circumstances. PPP encouraged businesses that had already laid off workers due to the pandemic to rehire them quickly without penalty.¹¹

¹⁰ FinTech played an important role, as well. Erel and Liebersohn (2020) study the response of FinTech to demand for financial services created by PPP. They find that FinTech was disproportionately used in ZIP codes with fewer bank branches, lower incomes, larger minority share of the population, in industries with less *ex ante* small business lending, and in counties where the economic effect of the pandemic were more severe.

¹¹ Rules for loan forgiveness and for loan forgiveness reduction have been evolving. We describe guidance at the time of this writing in more detail here. Loans can be fully forgiven if loan proceeds are spent and qualifying costs are incurred during the covered period of the loan, which begins when the loan is disbursed (or during an alternative covered period, depending on how the borrower manages payroll); at least 60 percent of the loan amount (originally 75 percent) was used on payroll costs; and staffing and compensation levels are maintained in the covered period relative to the reference period. The covered period is 24 weeks for loans made after June 5, 2020. For loans made before June 5, 2020, borrowers can choose between a 24-week or eight-week covered period. Borrowers can choose one of two reference periods: February 15, 2019 to June 30, 2019, or January 1, 2020 to February 29, 2020. (Seasonal employers have different rules.) PPP also includes a safe harbor provision that allows borrowers to avoid loan forgiveness reductions due to decreases in headcount or compensation that occurred between February 15, 2020 and April 26, 2020, provided that headcount and compensation are restored by December 31, 2020 (originally June 30, 2020). Loan forgiveness will also not be reduced if borrowers issue written offers to rehire workers who were employed on February 15, 2020, and those offers are not accepted, or if borrowers document an inability to rehire similarly qualified workers for vacancies as of December 31, 2020. Loan forgiveness will not be reduced if borrowers cannot maintain employment levels due to an inability to return to the same level of business as of February 15, 2020 because they are complying with coronavirus-related guidance for social distancing, sanitation, or worker or customer safety requirements from various federal agencies and departments between March 1, 2020 and

Borrowers do not need to demonstrate hardship in order to qualify for a forgivable loan, which streamlines the process and allows banks to get money to businesses quickly. Instead, they need to offer a series of good-faith certifications, including: “Current economic uncertainty makes this loan request necessary to support the ongoing operations of the Applicant.”¹² Borrowers must also certify that the business intends to use the funds received for payroll and other operating expenses and that they are not applying for a duplicative loan. For a loan to be forgiven, in some cases, businesses may need to present documentation to lenders demonstrating that they complied with the terms of the loan. In other cases, businesses simply need to attest to this.

To get funds to businesses quickly, PPP delegates authority to lenders to determine borrower eligibility. By the PPP’s structure, lenders do not need to assess the ability of the borrower to repay the loan. No collateral or personal guarantees from borrowers are required, and no credit-elsewhere tests are applied. Lenders simply need to establish that a business was operational on February 15, 2020 and verify its payroll.

To entice banks to participate, the program allowed them to charge generous fees — five percent of principal on loans up to \$350,000, three percent on loans between \$350,000 and \$2 million, and one percent on loans above \$2 million up to \$10 million. Lenders can charge an interest rate of one percent on the portion of the loan that is not eligible for forgiveness, and loans have zero weight in banks’ capital requirements. In the statute, lenders are “held harmless” in the event of borrower misrepresentation, but Treasury/SBA did not waive requirements under the Bank Secrecy Act and required anti-money-laundering compliance programs.

The Paycheck Protection Program and Health Care Enhancement Act was signed into law on April 24, 2020, and increased PPP funding by \$320 billion. The Paycheck Protection Program Flexibility Act (PPPPFA) was signed into law on June 5, 2020. The covered period of the forgivable loan was extended from eight weeks to 24 weeks (or until December 31, 2020). PPPFA also allowed businesses to spend 40 percent of forgivable funds on non-payroll expenses, rather than the 25 percent previously established by Treasury/SBA regulation. The maturity of the loans was increased from two years to five years for loans issued after June 5.

December 31, 2020. On October 8, Treasury/SBA issued additional guidance that exempted borrowers with loans under \$50,001 from any loan-forgiveness reductions based on failing to maintain headcount or wages.

¹² Paycheck Protection Program Borrower [Application Form](#), revised June 24, 2020.

4.2. Design concerns

On the whole, PPP is well designed relative to objectives for financing during a short-term shutdown we described earlier. It was able to get an astonishing amount of money to millions of small businesses very quickly. It relied on (what are essentially) grants and not loans. It took measures to encourage banks to participate. It avoided revenue tests and it did not target select industries. Its goals — ensuring small business continuity and preserving employment relationships — were the right ones.

But we have four concerns about some design elements. First, PPP is too focused on payroll expenses. The goal should have been to replace revenue, not simply to assist businesses with meeting payroll obligations. Even the post-PPPFA payroll share for forgiveness of 60 percent is too high from this perspective.

Second, the program was designed with a short lockdown period in mind. This approach was reasonable given widely held expectations about the course of the pandemic in early March, and to some extent was addressed by PPPFA modifications to the program. Even still, the program should be more flexible post-lockdown in allowing labor to be reallocated across firms and industries, a problem given a longer period of partial shutdown. PPP contains incentives that work against this needed reallocation.

Third, a major flaw in PPP's design was the original CARES Act appropriation of \$349 billion, and a major flaw in its execution was Treasury's inability to convince banks that they would be held harmless in the event of borrower misrepresentation. Both of these flaws led to the reality and public perception that PPP funds were flowing to relatively better-resourced and less-vulnerable small and mid-size businesses.

Finally, Hubbard and Strain (2020) estimated that the PPP's original goals would require around \$1 trillion. With only \$349 billion originally appropriated for PPP — and the intense demand for PPP loans in the early days of the program — a perception developed that only businesses with preexisting relationships with participating lenders would be able to access the program. Lenders, in a rush to process applications and out of concern that they would not be held harmless in all circumstances, focused lending on existing bank customers.

5. Evaluating PPP: Program Statistics, Implementation Challenges, and Existing Evidence

In this section, we present basic statistics about PPP loans, and discuss implementation challenges. We also review current empirical evidence on the effectiveness of PPP.

5.1. PPP program statistics

Table 1 presents PPP program statistics. As of August 8, PPP had approved 5,212,128 loans representing a total of \$525 billion provided by 5,460 lenders. The average loan size is \$101,000. The solid majority of program dollars were included in loans of less than \$2 million, and the overwhelming majority of loans were for less than that amount. Loans of over \$2 million represent 0.6 percent of all loans and 20 percent of all dollars loaned. In contrast, around 87 percent of all PPP loans were made for less than \$150,000, and 28 percent of all funds loaned were part of loans of less than that amount. Figure 1 shows loan counts and loan amounts over time.

Figures 1A and 1B show loan totals and loan amounts by state, respectively. Granja, *et al.* (2020) study the targeting of these loans across geography, and do not find evidence that the first round of PPP funds went to parts of the country that saw the largest declines in hours worked or business shutdowns. Further research is needed to study the targeting of the full program. We also note that the entire country was affected by shutdowns, and the degree to which different states were affected by the pandemic varied at different times, particularly as the nation entered the summer months. Figure 2A shows PPP loans by industry and employment losses by industry.

5.2. Implementation challenges

Table 2 presents a timeline of select PPP events, and includes some implementation challenges. Before the program officially launched on April 3, banks and other industry associations were warning of a chaotic beginning to the program, arguing that borrower verification would be onerous and would hamper the government's objective of getting money into the economy quickly, and due to confusion about basic program requirements like how lenders should calculate payroll costs. Due to confusion about the program, on the day it launched only eight of the 25 largest SBA 7(a) lenders were taking applications.

The early stage of PPP was also characterized by intense demand. By the end of its second week, all \$349 billion of CARES Act PPP appropriations had been exhausted. Thousands

of submitted applications remained unapproved. There were accusations that large banks violated the first-come, first-served structure of the program to favor large borrowers.

Articles in the press reported that some publicly traded companies or their subsidiaries had received PPP loans. On April 23, SBA released guidance that publicly traded companies would likely find it difficult to certify in good faith that they needed PPP loans.¹³ Treasury/SBA gave businesses until May 7 (later extended to May 14¹⁴ and then May 18¹⁵) to return PPP funds without facing a penalty. On April 28, Treasury Secretary Mnuchin announced that a review of PPP loans in excess of \$2 million would take place. The Secretary warned of potential criminal penalties for borrowers found to have misrepresented themselves or not to have complied with the terms of the loan.¹⁶ On May 13, SBA attempted to reassure borrowers and indicated that loans of less than \$2 million would be assumed to have made certifications of need in good faith.¹⁷

In our view, publicly traded firms or their subsidiaries should not have been eligible for PPP loans. But confusion over eligibility for PPP loans, which borrowers would be audited, and under what terms those audits would take place had a profound effect on the program.

Figure 1 shows PPP loan counts and dollars loaned over time. During the period of uncertainty discussed above, shown in the light- and dark-grey bars in Figure 1, the slope of both lines flattened. Dollars loaned have increased more slowly since this period of Treasury-sown confusion ended on May 18. New PPP loans continued to be made in the second half of May and into June and July, but at a much slower rate than in April.

¹³ See question 31 in “Paycheck Protection Program Loans: [Frequently Asked Questions](#),” last revised June 25, 2020: “[I]t is unlikely that a public company with substantial market value and access to capital markets will be able to make the required certification [of economic need] in good faith, and such a company should be prepared to demonstrate to SBA, upon request, the basis for its certification.”

¹⁴ See question 43 in “Paycheck Protection Program Loans: [Frequently Asked Questions](#),” last revised June 25, 2020.

¹⁵ See question 47 in “Paycheck Protection Program Loans: [Frequently Asked Questions](#),” last revised June 25, 2020.

¹⁶ For example, Secretary Mnuchin made this statement on April 28 [on CNBC](#): “I really fault the borrowers who made these certifications. Now, there were some banks early on who put things up on their website and prioritized their customers. We immediately told them that that was wrong. They took it down. So, you know, I want to be very clear: it’s the borrowers who have criminal liability if they made this certification and it’s not true. And as I said, we’re going to do a full audit of every loan over \$2 million. This was a program designed for small businesses, it was not a program that was designed for public companies that had liquidity. Again, the certification was very clear in saying that if people had other sources of liquidity, they could not take this loan.”

¹⁷ See question 46 in “Paycheck Protection Program Loans: [Frequently Asked Questions](#),” last revised June 25, 2020: “Any borrower that, together with its affiliates, received PPP loans with an original principal amount of less than \$2 million will be deemed to have made the required certification concerning the necessity of the loan request in good faith.”

Of course, implementation shortcomings were inevitable to some degree in standing up a program as ambitious as PPP in a short period of time in the midst of a pandemic. But Treasury's muddled management of PPP's implementation is noteworthy because of its failure to take seriously the advice it was given by a range of private-sector participants and policy experts, leading it to make mistakes that were both forecastable and forecasted.

5.3. Brief review of existing economic research on the PPP

Study of the PPP by academic researchers is still in the working-paper stage, but some notable findings exist that shed light on the early effects of the program. We briefly survey that research below.

Bartik, *et al.* (2020) study the original \$349 billion of PPP funds. Using a survey of small businesses, they find that PPP approval increased self-reported firm survival probability by 14 to 30 percentage points. They also find that banks allocated PPP funds to firms with higher PPP treatment effects. But these firms were also more likely to have stronger connections to banks, while firms with less cash-on-hand were less likely to have their applications approved. They find that PPP had a positive but statistically insignificant impact on employment.

Quite modest employment effects are also found by Chetty, *et al.* (2020), which analyzed data from Earnin, a financial management application.¹⁸ Granja, *et al.* (2020) also do not find evidence that the first round of PPP had a substantial effect on employment, or on other local economic outcomes. Bartik, *et al.* (2020) find that states that received more PPP loans and those with more generous unemployment benefits had labor markets whose declines were relatively less deep and whose recoveries were relatively more rapid. Chodorow-Reich, *et al.* (2020) find that PPP relaxed liquidity constraints facing firms, allowing some firms to pay down existing credit line balances.

Autor, *et al.* (2020) use weekly data from Automatic Data Processing (ADP) payroll records to study PPP's effect on employment. Using a difference-in-differences event study framework, they compare employment at firms above and below the 500-employee PPP eligibility threshold. Through the first week of June, they find that PPP increased employment by between two percent and 4.5 percent. After scaling by the take-up rate, they estimate PPP

¹⁸ Autor, *et al.* (2020) discuss limitations in the Chetty, *et al.* (2020) study, including that Earnin data are focused on very low-wage workers, with median wages equal to roughly the 10th percentile of wages in their industry, and that the absence of reported standard errors makes the Chetty results hard to interpret.

increased aggregate payroll employment by 2.3 million workers, again through the first week of June.

Autor, *et al.* divide total program expenditures by their estimate of PPP's effect on aggregate employment and report a cost-per-job-supported estimate of around \$224,000. The paper notes that "while this is a substantial cost per job supported, it would be premature to offer a cost-benefit analysis of the PPP at this time," and points to the need to take a longer-term view of PPP's effects. We agree, and would add that a short-term cost-benefit analysis should include other factors. For example, many workers who were kept on employer payrolls this spring would likely have been receiving unemployment insurance benefits in the absence of PPP. A short-term cost-benefit analysis should include cost savings from reducing the demand for social insurance and safety net benefits.

More fundamentally, we disagree with Autor, *et al.* in that we do not find cost per job supported to be a sufficient statistic to assess PPP's success. PPP is not exclusively a jobs program, and any evaluation of its effectiveness per dollar of program expense — even a short-run estimate — must include the benefit of preserving small businesses and employment relationships holistically, including social benefits in excess of private benefits and the benefits from hastening the economic recovery by supporting labor demand over the medium term.

6. Evaluating PPP: Empirical Analysis

We evaluate the effects of PPP on the employment, financial health, and continuity of small businesses. To do this, we use data from the Dun & Bradstreet Corporation, a company that provides commercial data and analytics to businesses. We are able to identify businesses in the D&B data that applied for PPP loans of \$150,000 or more. We do not observe if those companies received a loan, or the exact amount (above \$150,000 or more) of any loan received. We are not able to observe if a business applied for a PPP loan of less than \$150,000. Information on loan applications comes from SBA and is merged into the D&B data.

We estimate standard difference-in-difference models of the effect of PPP application and of PPP eligibility based on size. We use several treatment-control groups in our analysis. We also estimate the dynamic effect of PPP application and eligibility using event studies. We find evidence that PPP increased employment, financial health, and continuity. We also find that the effect of PPP is unfolding, with effects on employment and financial health growing over time

and reaching their peak in August, the last month for which we have data. In this section, we discuss the data, our methods, and these results in further detail.

6.1. Dun & Bradstreet

D&B is a global data and analytics company whose clients are businesses. The company was founded in 1841 as The Mercantile Agency, and became Dun & Bradstreet in 1933. It has extensive coverage, with over 355 million business records and data curated from tens of thousands of sources, including public registries, newspapers and websites, its own investigations and telephone interviews, courts and legal filings, financial statements, insolvency records, and its own network, making use of proprietary and publicly available information. It is the world's largest commercial database, and counts 90 percent of the Fortune 500 companies as clients, along with every cabinet agency in the U.S. government.

D&B is able to track whether businesses pay their bills on time through its relationships with landlords, mortgage companies, credit card companies, office suppliers, and the like. Their clients make use of D&B's ability to predict whether a particular establishment might be delinquent in order to help clients manage financial risk. D&B has significant reach. For example, the U.S. government has historically required companies that want to receive federal contracts to register with D&B, as does Apple for companies that want to distribute applications through its App Store. The Food and Drug Administration uses a company's D&B registration number as a way to verify that importers of pharmaceutical products are legitimate businesses, and to confirm that applicant contact information is accurate and complete.

6.2. Sample, variables, and descriptive statistics

Our sample includes all establishments in the D&B database active as of October 2019 with one to 1,000 employees. We do not include sole proprietorships, establishments with zero reported employees, establishments with missing state and industry codes, and establishments with modeled employee counts. We assign each establishment to a business-size category (*e.g.*, one to 500 employees, 501 to 1,000 employees) based on employment in February 2020. We also stratify establishments based on whether they applied for a PPP loan worth \$150,000 or more. (We are only able to observe whether businesses applied for PPP loans of at least \$150,000.)

Table 3 presents summary means and standard deviations for key variables and the distribution of establishments over industry. Businesses that applied for a PPP loan of \$150,000

or more are nearly three times as large as those that did not. This difference is likely due to the relatively large size of the loan we are able to observe. Each group of businesses have comparable Paydex scores (discussed below), and over the entire sample period establishments with 501 to 1,000 employees are more likely to go out of business. The group least likely to go out of business during the sample period are establishments that we observe have applied for large PPP loans, and by a wide margin.

Key variables for our analysis include PPP application (for loans of at least \$150,000), establishment employment, state, and industry. We use Dun & Bradstreet's Paydex variable as our measure of a business's financial health. Paydex is an indicator based on whether and how a business is paying its bills. Paydex ranges from zero to 100. A Paydex score of 80 denotes that payments made to D&B have generally been made within the terms of the covered agreement. A Paydex score over 80 indicates that payments reported to D&B have been made earlier than their terms required. Paydex scores of 70, 60, 50, 40, 30, 20, and below 20 indicate that businesses are 15, 22, 30, 60, 90, 120, and over 120 days late, respectively, in paying their financial obligations. Paydex scores evolve slowly, and for each business a given month's Paydex score reflects transactions that have taken place over the previous several months.

Examples of recent papers that have used D&B data to examine changes in the financial health of small businesses include Barrot and Nanda (forthcoming), which studies the impact of the 2011 federal Quickpay reform using establishment-level employment data and Paydex scores from D&B. Chava, Oettl, and Singh (2019) examine the effects of state minimum wage increases on the financial health of small businesses. The authors use the D&B Paydex score as their primary measure of financial health for 15.2 million establishments from 1989-2013.

D&B's out-of-business indicator is our measure of business continuity. It is a zero-one variable. D&B determines a business is out of business if it is no longer engaging in transactions, through direct investigations, and in other ways. Two separate authorities — *e.g.*, management or owners of the company itself, if a business isn't listed with a landlord at its address, if a business is no longer licensed, etc. — must confirm a business has closed for it to be recorded as out of business.

Panels (A) and (B) of Figure 2 plot average establishment employment per month for establishments with one to 500 employees in our analysis sample (Panel (A)), and establishments with 501 to 1,000 employees (Panel (B)). These plots indicate that employment among the D&B

sample is very stable. Among businesses with 1-500 employees (Panel (A)), employment decreased by 1.42 percent in August relative to November. Panel (B) shows employment declines of 1.83 percent among establishments with 501 to 1,000 employees. In contrast, employment reported in official statistics shows much larger losses. The summary statistics we present suggest that employment evolves slowly among firms of all sizes, and our analysis does not indicate any relationship between the pace of evolution and PPP application. The relative stability of employment in the D&B data biases against finding a PPP employment effect, in both our treatment-on-the-treated and intent-to-treat models. We interpret all our estimates of PPP's effects relative to trends in the D&B data.

We present the average Paydex score per month in Panels (C) and (D) of Figure 2. These figures indicate that business' financial health in our sample is relatively stable, as well, falling in both panels by less than one point. This apparent stability is most likely due to the relatively lengthy look-back period for Paydex. As with the stability of employment, this biases against finding an effect of PPP on financial health.

The share of establishments that went out of business is shown in Panels (E) and (F) of Figure 2. The share of businesses with less than 500 employees that went out of business increased by a factor of 15 between November and August (Panel (E)). Businesses with 501 to 1,000 employees saw closure rates increase by a factor of 13 (Panel (F)).

6.2. Estimation strategy

To identify the effect of PPP on business outcomes, we estimate the following equation:

$$y_{im} = \alpha + \beta(PPP_{ia} X Post_m) + \gamma PPP_{ia} + \delta_{sm} + \delta_{jm} + \varepsilon_{im}, \quad (1)$$

where y_{im} is an outcome experienced by business i in month m . Our analysis sample covers ten months, November through August, with five months of pre-PPP period (the CARES Act was signed on March 27) and five months of post period (PPP launched on April 3). PPP_{ia} is an indicator as to whether business i applied for a PPP loan of at least \$150,000. This variable is our measure of PPP — we do not observe whether businesses actually received PPP loans, or if they did receive loans, the size of the loan. δ_{sm} is a state-by-month effect, and δ_{jm} is an industry-by-month effect. $PPP_{ia} X Post_m$ equals 1 if business i applied for a PPP loan and the month is April, May, June, July or August. Standard errors are clustered by state.

The coefficient of interest is β , which captures the effect of applying for a PPP loan of \$150,000 or greater on the outcome variable. The industry-month effects capture time varying shocks to businesses in a given industry, and the state-month effects capture time varying shocks to businesses in a given state. The effects of the pandemic and the lockdowns varied substantially across industries and states. Using within-state-by-month and within-industry-by-month variation to estimate the effect of PPP application helps ensure that our results are not driven by time varying public health or social-distancing policy differences between states and industries.

To trace the dynamics of PPP over the months since the CARES Act, we estimate a difference-in-difference event study of the following form:

$$y_{im} = \alpha + \sum_{t=-4}^5 \beta_t(PPP_{ia} X \varphi_t) + \gamma PPP_{ia} + \delta_{sm} + \delta_{jm} + \varepsilon_{im}, \quad (2)$$

where β_t is a vector of nine parameters estimating the dynamic effect of PPP, φ_t is a month dummy, and everything else is the same as in equation (1). The dynamics of the effect are interesting because of lags in receipt time, the time it may take employers to bring workers back onto payroll, and treatment-control differences driven by the economic outcomes of control businesses worsening over time because they do not have access to PPP funds. The trend in the pre-period coefficient vector is a partial check against differential employment trends among businesses that applied for a PPP loan and those that did not.

We observe whether a business applied for a PPP loan of \$150,000 or more. If some businesses that applied were turned down, then our estimates of PPP's effect are biased downward, because the treatment group would be contaminated by control observations. Another important source of downward bias in our estimates of PPP's effect is that many businesses in our control group applied for and received PPP loans of less than \$150,000. As presented in Table 1, around 87 percent of all PPP loans were made for \$150,000 or less, and these loans accounted for 28 percent of all funds disbursed. These are treatment-on-the-treated estimates, and do not control for selection into applying for PPP. Firms that did not apply could be very different from those that did, perhaps thinking that they did not need the funds to continue operating, or, alternatively, perhaps thinking that the situation was hopeless. They might have

also been less financially savvy, which could be correlated with other outcomes and characteristics.

Knowing how PPP affected firms that selected into participating is interesting and important, but it confounds demand for PPP with PPP itself. To address this distinction, we estimate intent-to-treat models. In these models, we do not use information on whether a business actually applied for a PPP loan. Instead, we compare outcomes for establishments that were eligible for PPP based on their size to establishments that were ineligible in a difference-in-differences framework. Specifically, we estimate the following equation:

$$y_{im} = \alpha + \beta(PPP_{ie} X Post_m) + \gamma PPP_{ie} + \delta_{sm} + \delta_{jm} + \varepsilon_{im}. \quad (3)$$

All variables in equation (3) are the same as in equation (1) except PPP_{ie} , which equals 1 if a business is eligible for PPP based on its size, and equals 0 otherwise. We also estimate intent-to-treat event studies analogous to equation (2).

6.3. Results

Results for employment. Table 4 presents estimates of equations (1) and (3) for (the log of) employment. The specification in the first column compares establishments with one to 500 employees that applied for a PPP loan of \$150,000 or more to establishments in the same size class but did not apply. PPP application is associated with a 0.90 percent increase in employment. Columns (2) and (3) present the same specification, but on smaller samples of establishments. Column (2) looks at establishments between one and 250 employees, and similarly finds a 0.94 percent increase in employment from PPP. Column (3) analyzes a sample of establishments of between 251 and 500 employees. Here, the effect on employment is negative, -3.2 percent. This result might be driven by greater demand for larger PPP loans within that size class among the treatment group, confounded by many control firms taking out PPP loans that we do not observe. But in evaluating the program as a whole, it is worth noting that there are approximately 82 million establishment-months with one to 500 employees in our sample, and around 360,000 of those are establishment-months with 251 to 500 employees.

These estimates are valuable in part because they implicitly control for establishment-size category. But they are likely biased downward because the treatment effect is defined as a business applying for a PPP loan of \$150,000 or greater, while most PPP loans were for less than

this amount, so PPP-treated establishments are in the control group. The specification in Column (4) attempts to address this by defining the treatment group as establishments with less than 500 employees who applied for a PPP loan of at least \$150,000 and the control group as establishments with between 501 and 1,000 employees. Here, we estimate a PPP employment effect of 1.78 percent, substantially larger in magnitude than the coefficients discussed previously.

The estimates reported in Columns (1) through (4) are treatment-on-the-treated estimates. In the context of evaluating PPP, this is interesting because estimating program outcomes conditional on selection is important and relevant (program participation is voluntary) and survey evidence finds that over 70 percent of small businesses participated in PPP.¹⁹ But the estimates do confound the effect of demand for PPP with the effect of PPP, in addition to the limitation that we only observe PPP loans of at least \$150,000.

To address these limitations, Column (6) reports intent-to-treat estimates in which we define the treatment group purely based on size eligibility — *i.e.*, we do not use information on whether a business applied for a PPP loan — and the control group is establishments with 501 to 1,000 employees. We estimate that PPP size eligibility increased employment by 1.38 percent. This result might suggest an important role for smaller PPP loans in supporting employment.

Column (5) also reports intent-to-treat effects but for firms close to the 500-employee cutoff (eliminating firms near the cutoff). The advantage of this specification is that it directly controls for firm size. Comparing firms in the 400-600 employee window, we do not find a PPP employment effect. This result, along with the estimates reported in Column (6), might suggest that PPP was most effective in supporting employment among smaller firms, at least through August.

The specification that estimates the effect of PPP within the 400-600 employee window arguably offer the strongest basis for causal inference assuming that the effect of PPP loans on employment is similar for firms of different sizes. But this assumption is very strong, and it is quite likely that PPP loans have effects that vary by firm size. The estimates reported in Table 4 suggest this is the case, and the \$10 million maximum for PPP loans also suggests that PPP would offer relatively more assistance to smaller firms. In the D&B data, 2019 annual sales for

¹⁹ The Small Business Pulse Survey of the U.S. Census Bureau finds that 72.7 percent of small businesses received financial assistance from PPP since March 13, 2020 as of August 22, 2020.

firms with 1-500 employees were \$2.4 million, while those for firms with 400-475 employees were \$46.4 million. These consideration suggests that a holistic evaluation of PPP should include estimating its effects on firms of all eligible sizes. Therefore, our preferred specifications are presented in Columns (4) and (6).

Our results contrast with Autor, *et al.*, who find employment effects for larger firms using ADP data. It is interesting to note that Autor, *et al.*'s estimates become less precise as the window around the 500-employee eligibility cutoff shrinks. This finding may be due to sample size, or it could indicate that PPP is relatively less effective at supporting employment for larger firms in the ADP data.

We present event study graphs using our two preferred treatment and control groups. Figure 3 presents results from equation (2). Panel (A) shows the dynamic effect of PPP on employment when the treatment group is establishments with between one and 500 employees who applied for a PPP loan of at least \$150,000 and the control group is establishments with 501 to 1,000 employees. There is no trend in the pre-period coefficients, although the confidence interval on the negative coefficient in February does not include zero. The absence of a pre-period trend supports a causal interpretation of the estimates. In the post-period coefficients, the effect of PPP increases over time, rising to 3.13 percent in August.

Panel (B) shows a similar effect of PPP on employment. Here, the dynamic effect captures intent to treat, comparing establishments with 500 or fewer employees to those with between 501 and 1,000, regardless of whether the firms applied for a PPP loan. Like Panel (A), there is no noticeable trend in the pre-period, and the strength of the effect increases in the post period with each month. In August PPP eligibility is found to increase employment by 3.83 percent.

To interpret the magnitude of these effects, consider that average establishment employment fell by 1.6 percent in the D&B data for establishments with one to 1,000 employees over the sample period, between November and August. In light of this change, the 1.78 percent increase in employment reported in Column (4) of Table 4 and the 1.38 percent increase reported in Column (6) of Table 4 are both substantial increases. The effects for the month of August — 3.13 and 3.83 percent, respectively — specifically are even more substantial.

Results for financial health. Table 5 reports results for which the outcome variable is financial health, as captured by Dun & Bradstreet's Paydex score. Table 5 is the same as Table 4,

except for the outcome variable. The first three columns of Table 5 report results from specifications where the treatment and control groups are the same firm employee-size class. Taken together, they suggest that financial health worsened for firms with between 1 and 250 employees that applied for PPP loans of at least \$150,000. We think this puzzling finding is most likely the result of PPP-treated observations (*i.e.*, establishments with less than 250 employees that applied for loans of less than \$150,000) contaminating the control group.

For reasons discussed previously, our preferred specifications are reported in Columns (4) and (6). The specification in Column (4) compares firms with 500 or fewer employees that applied for PPP loans of at least \$150,000 with firms with 501 to 1,000 employees that were not eligible for PPP. PPP predicts a Paydex increase of about 0.31 points. Column (6) presents results from an intent-to-treat specification. Here, PPP eligibility boosts Paydex by about 0.35 points. Similar to our results for employment, PPP seems to have had a larger impact on firms with fewer than 400 employees, as suggested by comparing the results in Column (5) with Column (4).

Figure 3, Panels (C) and (D) present event study graphs that trace out the dynamic effect of PPP for our two preferred specifications. As with employment, the effect of PPP on financial health (as measured by Paydex) grows over time. Both figures show a flat trend centered on zero for the pre-period coefficients estimating the effect of PPP in November through February relative to March. As with employment, this supports a causal interpretation of our estimates. The effect of PPP application on financial health was estimated imprecisely in April, and precisely every month after. The magnitude of the effect increased considerably over time, more than doubling between June and August.

The dynamic intent-to-treat estimate are shown in Panel (D). As with the results in Panel (C), PPP's effect on financial health is estimated imprecisely in April but precisely for the following four months. The magnitude of the effect in August is more than double the effect in May. PPP eligibility is estimated to have increased Paydex in August by 0.52 points.

The magnitude of the effect is substantial. For all firms with one to 1,000 employees, average monthly Paydex fell by 0.28 points from November to August. A PPP Paydex effect of 0.31 (Column (4)) and 0.35 (Column (5)) represents a significant increase relative to the change in financial health of all firms during our sample period. As with employment, the effect of PPP

on Paydex in June is substantially larger than the post-period average, suggesting that the effects of PPP on financial health may be increasing over time.

Results for business continuity. Table 6 reports results for D&B's out-of-business variable. Everything in Table 6 is the same as in Tables 4 and 5, except the outcome variable. PPP eligibility or application is estimated to have reduced business closure in every specification at conventional levels of statistical significance, except for Column (5). Column (4) presents results from the specification that compares firms that applied for a PPP loan of at least \$150,000 to firms with between 501 and 1,000 employees, which were ineligible for PPP. PPP application is estimated to have reduced the odds of business closure by 0.47 percentage points. Column (6) presents results from our intent-to-treat model. Here, PPP eligibility is estimated to reduce business closure odds by 0.22 percentage points. Column (5) reports intent-to-treat results for a smaller window around the 500-employee cutoff. As with employment and financial health, we do not find a significant effect of PPP on business closure among firms with 400—475 employees.

Panels (E) and (F) of Figure 3 present event studies for those two models. The pre-period coefficients show a trend, and these results should be interpreted cautiously. The confidence interval on pre-period coefficients includes zero in several cases. In the post-period, the magnitude of the effect is larger in June than in April or May. This pattern is similar to our employment and Paydex results. The magnitude of these effects is large.

To place the difference-in-difference estimates and June event study coefficient estimates in context, the average establishment out of business indicator in August was 0.42 percentage points higher than in November for firms with one to 1,000 employees.

6.4. Discussion and conclusions

Our results point to PPP playing a significant role in the health and viability of small businesses. Applying for a PPP loan of \$150,000 or more and PPP eligibility as determined by firm size both increase employment, financial health, and business continuity. In addition, we find that it may have taken a month or two for PPP to kick in. An alternative interpretation is that PPP was more effective in a partially reopened economy (*i.e.*, June—August) than during the lockdowns.

Several caveats are in order. We avoid making strong statements about the success or failure of PPP because the program is so young, and we are only analyzing the first five months

of the program. PPP did have important short-run goals, which included maintaining employment relationships during the lockdowns and supporting consumer spending by allowing workers to continue to be paid. But PPP has important medium-run goals as well, and it is too early to say anything definitive about its success or failure. Those goals include mitigating business closures after the economy had partially reopened (which we observe for about one month), supporting employment and reducing unemployment, and increasing productivity by preserving firm-specific human capital, worker-firm matches, and networks. Crucially, by preserving the productivity capacity of the small business sector, PPP stands to quicken the recovery by supporting labor demand over the medium run. In addition, the firms in the D&B data are not nationally representative, and they exhibit employment and financial health indicators that are likely more stable than typical firms. We also want to stress the tentative nature of our conclusions. As shown in the dynamics of the effect (in Figure (3)), the effect of PPP on employment, financial health, and business continuity is evolving, and is much stronger in July and August than in April and May. The effects of PPP are unfolding, and it will be particularly important to see what happens to businesses that received PPP and the workers they employ once they have exhausted their forgivable loan.

7. Retrospective and Lessons for the Future

Many of the common criticisms of the PPP as failed by design and effect were too strong. Banks were skittish about participating, particularly in the early days of the program. But program demand by lenders was sufficient to allow the government to transfer funds in an amount roughly equal to 10 percent of an typical quarter's GDP to small businesses. With the vast majority of loans and the sizeable majority of program dollars going to loans of less than \$2 million, media coverage suggesting that PPP was in the main offering grants to large and well-connected firms was overblown. Many of the anecdotes in the media implying fraudulent participation in the program actually pointed to firms that were eligible for PPP loans under the statute. The criticism that the original CARES Act appropriation of \$349 billion was too small, obvious from the outset, was quickly proven valid by events, but Congress rectified that swiftly.

Could policymakers have designed a more effective and cost-effective intervention than a small business revenue replacement program? In theory, one could argue that relying on the Unemployment Insurance (UI) system to replace workers' income and using a PPP-like program

to help small businesses with non-payroll cost has appeal to some economists and analysts. But that plan would require worker-firm separations, albeit temporary, to take place. It would change the default for small businesses from keeping workers employed (as under a revenue replacement program) to recalling workers following a separation, which is the wrong place for the default to be during the shutdown. The UI system in many states was simply and troublingly unable to handle the demands placed on it during the shutdown — increasing those demands would not likely lead to the most successful outcomes. Finally, having both UI and a small business revenue replacement program is good policy design because it allows for redundancy, with multiple programs operating to replace workers' incomes.

For the reasons we discussed previously, we do not view a loan program as an adequate substitute for a small business revenue replacement program. Many businesses would not want to add to their debt burdens, even under very favorable lending conditions. Many would resort to layoffs, which would disrupt other businesses, deepen the recession, and hurt workers' employment and earnings opportunities.

Even though a small business revenue replacement program may have been the best available option, the PPP could have been better designed and better implemented in ways we previously discussed: It is too focused on payroll expenses; banks should have been given stronger assurances that they would be held harmless; and its initial appropriation was too small. Much of the confusion about the program was driven by chaotic Treasury/SBA management which weakened the program's effectiveness, limited its reach, and ultimately led to a falloff in demand for PPP funds.

PPP was designed for a short shutdown that would be followed by a strong and rapid recovery. But the shutdown was longer than anticipated and the recovery decelerated after a burst of improvement in May and June. In addition, partial shutdowns may remain in some regions for an extended period of time. Subsequent changes to PPP addressed these concerns, but the program needed to facilitate the transition from the 'freeze the economy in place' stage to the 'allow labor to reallocate across firms and industries' stage. The economy overall, including workers, will benefit from a fast transition from the pre- to post-lockdown equilibrium. PPP could facilitate this transition by eliminating any link between PPP loan forgiveness and pre-crisis employment levels.

We have argued that many small businesses needed equity or grants, and not loans. But a lending program could — and in the future, perhaps should — exist alongside a revenue replacement program, particularly for a partially reopened economy. An advantage of a lending program is that business that expect to be nonviable in the post-pandemic economy would be less likely to take out a loan than to accept a grant. This feature would keep the cost of the program lower, channel funds more effectively, and allow for a swifter transition to the post-pandemic equilibrium. A disadvantage — and the reason we do not support this during the shutdown period — is that some firms that might be viable in the absence of the loan could be tipped over into insolvency by taking out a loan. More practically, in the shutdown, we are concerned that few firms would participate in a lending program.

One way to structure such a lending program could be in two stages, following a venture capital model preceded by a broadly available loan. In the first stage, the Treasury Department could issue a small loan to firms using limited underwriting standards, knowing that the loan will have a high default rate. In the second stage, surviving firms could have access to additional funding. This financing would help to give many firms a lifeline for survival, while still well-stewarding taxpayer funds.²⁰

An alternative approach would be a federal business interruption insurance program for small and mid-size firms (analogous to the federal terrorism risk insurance program) layered on top of private business interruption insurance. Linking a trigger to a pandemic shutdown could require a shutdown order by a public official (*e.g.*, the governor of the state).

Looking forward, there are broader lessons as well. For a situation in which the government is shutting down large sections of the economy, Congress and the White House need to be willing to tolerate stories of “undeserving” beneficiaries of economic recovery programs. The alternative is upfront targeting measures that slow down aid and worsen the downturn. Another alternative is that programs are much less effective. PPP stands a chance at succeeding because its relief was broad based. The Treasury Department was much more conservative with putting taxpayer dollars at risk when approving the terms of the PPP, limiting early take-up. The Treasury’s conservative approach has extended to the Federal Reserve’s Main Street Lending

²⁰ The Federal Reserve’s Main Street Lending Facility offers another lending vehicle for small and mid-size firms. While the facility’s design remains in flux, its structure could also mimic better patient equity financing. Terms could include much longer maturity and very low interest rates, for example.

Facility, which received capital funds (along with other Fed facilities under the CARES Act). As a consequence of Treasury's aversion to putting that capital at risk, potentially driven in part by concern about stories of "undeserving borrowers," the facility is not supporting the economic recovery yet because it, essentially, is not making loans.

Another broader lesson is the need for government at the state and federal level to upgrade its computer systems. Banks were needed as intermediaries in part because the government's IT constraint would not have allowed for it to lend directly to banks in a timely fashion. Finally, the government's attempt to support small and mid-size businesses in the Pandemic Recession calls into question the nature of the division between the Fed and the Treasury. Following the Dodd Frank Act, Treasury is required to approve the terms of 13(3) lending programs, including the Main Street programs. But these are labeled as Fed programs, creating confusion about which agency is ultimately responsible for their success or failure. Furthermore, Congress appropriated \$454 billion in the CARES Act to Treasury to support Fed lending programs. At the time of this writing, little of those funds have been put to use to support the recovery, despite congressional intent. If Treasury is unwilling to risk capital losses as part of Fed lending programs, then Congress should consider whether an alternative structure to support small and mid-size businesses is advisable.

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Table 1: Summary of PPP Lending: April 3 - August 8

| | (1) | (2) | (3) | |
|----------------------------------|-------------------|------------------|--------------------------|--------------------|
| <u>Cumulative Lending</u> | <u>Loan Count</u> | <u>Net Loans</u> | <u>Number of Lenders</u> | |
| | 5,212,128 | 525,012,201,124 | 5,460 | |
| <u>Distribution by Loan Size</u> | <u>Loan Count</u> | <u>Net Loans</u> | <u>% of Count</u> | <u>% of Amount</u> |
| 150,000 and under | 4,552,452 | 147,477,537,518 | 87.3% | 28.1% |
| 150,000 - 2 million | 630,694 | 272,228,531,130 | 12.1% | 51.9% |
| Over 2 million | 28,982 | 105,306,132,476 | 0.6% | 20.1% |

Notes: Authors' calculations using SBA Paycheck Protection Program Report for August 8.

Table 2: Timeline of Major Events in the PPP Program

| Date | Description |
|----------------|---|
| March 27, 2020 | CARES Act signed appropriating \$349 billion for PPP. |
| April 2, 2020 | Treasury/SBA releases first interim final rule; 75 percent payroll requirement; 2-year repayment period; 0.5 percent interest rate; 8 weeks of covered expenses; application period to June 30th. |
| April 2, 2020 | Faced with complaints from small banks, Treasury raises the interest rate on PPP loans from 0.5 to 1 percent hours before the program launch. |
| April 2, 2020 | Bank associations, J.P. Morgan Chase Bank and industry associations warn of chaotic PPP launch; borrower verification requirements and payroll cost calculations are unclear. |
| April 3, 2020 | First round of PPP officially launches; only 8 of 25 largest SBA 7(a) lenders are taking applications. Bank of America and J.P. Morgan Chase begin accepting applications but only for existing customers |
| April 16, 2020 | First round of Paycheck Protection Program ends; original \$349 billion appropriation exhausted. Thousands of submitted applications remain unapproved. |
| April 20, 2020 | Small businesses sue large banks over allocation of loans. They claim that banks violated first-come, first-serve rules and gave priority to larger applications that would generate more fees. |
| April 23, 2020 | Treasury/SBA warns publicly traded companies and their subsidiaries against seeking loans; May 7 deadline to return funds. |
| April 23, 2020 | Treasury/SBA requires applicants to certify that the funds are necessary due to the current economic uncertainty, as well as a lack of other sources of funds to support their operations. |
| April 24, 2020 | Paycheck Protection Program and Health Care Enhancement Act signed into law authorizing an additional \$320 billion for PPP. |
| April 27, 2020 | Second round of PPP begins with \$320 billion in new funding. |
| April 27, 2020 | Treasury/SBA caps the dollar amount of loans that individual banks can originate at \$60 billion. |
| April 28, 2020 | Secretary Mnuchin announces full audits for loans > \$2 million; warns of criminal penalties for noncompliers. |
| April 29, 2020 | SBA temporarily blocks large banks from submitting loans. |
| April 30, 2020 | Justice Department launches probe of PPP. |
| April 30, 2020 | IRS confirms that PPP loans are excluded from gross income, but expenses paid for using PPP loans are not tax deductible. |

| | |
|----------------|---|
| May 5, 2020 | Senate introduces Small Business Expense Protection Act to treat expenses paid using PPP loans as ordinary deductible business expenses. |
| May 5, 2020 | Deadline for companies to return funds without penalty under safe harbor provisions extended from May 7th to May 14th. |
| May 8, 2020 | SBA IG warns requirement of 75 percent payroll costs and 2-year repayment burdens borrowers and may not reflect statutory intent. |
| May 13, 2020 | SBA announced that loans below \$2 million would be assumed to have satisfied good-faith certification requirements; opportunity for larger loans to be retuned without penalty. |
| May 13, 2020 | Deadline for companies to return funds without penalty under safe harbor provisions extended from May 14th to May 18th. |
| May 14, 2020 | Treasury says companies must use the total number of employees to determine eligibility for PPP loans rather than FTE as indicated previously. |
| May 22, 2020 | Treasury/SBA warn that it "may review PPP loans "of any size at any time in SBA's discretion"; borrowers required to retain documentation for 6 years. |
| June 5, 2020 | PPP Flexibility Act passed; covered period extended from 8 weeks to 24 weeks; repayment extended from 2 years to 5 years; payroll costs allowed to be 60 percent of total loan forgiveness amount, down from 75 percent. |
| June 12, 2020 | For determining PPP eligibility, the look-back period for criminal histories for non-financial felonies reduced from 5 years to 1 year. |
| June 30, 2020 | Hours before program expiration and with \$130 billion left, Congress extends the PPP application period to August 8. |
| July 6, 2020 | Under pressure from Congress, SBA releases the names of borrowers and lenders and date of approval for loans more than \$150,000, representing 15% of all approved loans and 75% of dollars lent. Exact loan amounts are not disclosed. |
| July 7, 2020 | Using data released by the SBA, researchers estimate that banks will earn \$24 billion in fees from PPP loans. |
| July 12, 2020 | New York City Comptroller report alleges that the city did not receive its fair share of PPP loans. |
| July 17, 2020 | Secretary Mnuchin asks Congress to consider automatically forgiving all loans for less than \$150,000, extend PPP, and suggest terms for PPP in a Phase 4 economic recovery package. |
| August 4, 2020 | Businesses, lobbyists, and professional organizations ask Congress to exempt PPP income from tax reporting. |
| August 6, 2020 | SBA releases guidelines on PPP loan forgiveness ahead of August 10 launch of forgiveness application platform. Many financial institutions delay submitting applications until regulatory and legislative uncertainty is resolved. |
| August 8, 2020 | PPP application period closes with nearly \$140 billion in reserve as Congress debates "Phase 4" economic recovery package. |

Sources: Authors' summary of various news sources and official documents.

Table 3: Summary Statistics in November 2019-March 2020

| Group | (1) 1-500 employees and applied for a PPP loan \geq \$150,000 | (2) 1-500 employees and did not apply for a PPP loan \geq \$150,000 | (3) All establishments 1- 500 employees | (4) All establishments 501-1,000 employees |
|--|---|--|--|--|
| Mean Number of Employees per Establishment | 33.8 (47.6) | 11.5 (35.2) | 12.5 (36.1) | 722.0 (167.0) |
| Mean Paydex Score | 73.9 (9.57) | 72.6 (14.1) | 72.7 (13.1) | 70.0 (10.7) |
| Out of Business (%) | 0.010 (0.985) | 0.157 (3.96) | 0.150 (3.86) | 0.325 (5.69) |
| Annual Sales in 2019 (\$) | 5,603,688 (24,365,380) | 2,168,570 (70,166,425) | 2,338,007 (68,691,245) | 66,242,380 (313,247,030) |
| Sectors (% share of employment) | | | | |
| Agriculture | 2.7 | 3.4 | 3.4 | 0.5 |
| Construction | 14.2 | 8.0 | 8.2 | 1.7 |
| Finance, insurance, real estate | 3.9 | 10.3 | 10.0 | 5.8 |
| Manufacturing | 12.4 | 4.8 | 5.2 | 20.9 |
| Mining | 0.5 | 0.3 | 0.3 | 0.7 |
| Public administration | 0.1 | 3.1 | 2.9 | 16.5 |
| Retail trade | 11.5 | 13.6 | 13.5 | 5.7 |
| Services | 41.6 | 46.6 | 46.4 | 40.3 |
| Transportation, communications | 4.6 | 4.9 | 4.9 | 5.1 |
| Wholesale trade | 8.4 | 5.0 | 5.2 | 2.8 |

Notes: Authors' calculations using Dun & Bradstreet data. This table displays means and standard deviations (in parentheses) in our pre-treatment period, November-March, for the main establishment employee-size groups used in our analyses. We also calculate the distribution of employment across industries at the 2-digit SIC level. The sample consists of all establishments operating as of October 2019 that meet our sample selection criteria.

Table 4: Estimating the Effect of PPP Loans on Establishment-Level Employment (D-in-D Estimates)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--------------------------------|----------------------|----------------------|---------------------|--------------------|---------------------|-----------------------|
| Dependent variable: Employment | | | | | | |
| Treated x Post x 100 | 0.902*** (0.0656) | 0.936*** (0.0655) | -3.20*** (0.470) | 1.78*** (0.234) | 0.0772 (0.366) | 1.38*** (0.258) |
| Treatment | 1-500; loan | 1-250; loan | 251-500; loan | 1-500; loan | 400-475; all estabs | 1-500; all estabs |
| Control | 1-500; no loan | 1-250; no loan | 251-500; no loan | 501-1,000; no loan | 525-600; all estabs | 501-1,000; all estabs |
| Observations | 81,404,032 | 81,043,431 | 360,601 | 3,980,677 | 110,712 | 81,523,211 |
| R-squared | 0.1390 | 0.1373 | 0.0432 | 0.2343 | 0.3783 | 0.0966 |

Notes: This table reports difference-in-difference estimates for the impact of PPP on establishment level employment. Data on establishment employment and PPP loan applications are from Dun & Bradstreet. The sample consists of establishments operational as of October 2019 that meet our sample selection criteria. For all regressions, the pre-treatment period is November-March and the post-treatment period is April-August. Each column uses a different treatment and control group, where “X-Y” indicates the size of the establishment by employment in February, “loan” indicates that we observe that the establishment applied for a PPP loan of at least \$150,000, “no loan” indicates the opposite, and “all estabs” indicates that we include all establishments in the analysis sample regardless of whether they applied for a loan. All regressions include state, month, and 2-digit SIC industry code fixed effects as well as state-by-month and industry-by-month fixed effects. Standard errors are clustered at the state level. Coefficients and standard errors are multiplied by 100 for ease of interpretation. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Estimating the Effect of PPP Loans on Establishment-Level Credit Scores (D-in-D Estimates)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|----------------------------------|----------------------|----------------------|---------------------|----------------------|---------------------|-----------------------|
| Dependent variable: Paydex Score | | | | | | |
| Treated x Post | -0.0392* (0.0220) | -0.0379* (0.0219) | -0.0349 (0.0969) | 0.305*** (0.0686) | 0.01 (0.154) | 0.349*** (0.0616) |
| Treatment | 1-500; loan | 1-250; loan | 251-500; loan | 1-500; loan | 400-475; all estabs | 1-500; all estabs |
| Control | 1-500; no loan | 1-250; no loan | 251-500; no loan | 501-1,000; no loan | 525-600; all estabs | 501-1,000; all estabs |
| Observations | 32,139,590 | 31,889,423 | 250,167 | 3,731,639 | 81,644 | 32,225,515 |
| R-squared | 0.013 | 0.013 | 0.021 | 0.024 | 0.027 | 0.012 |

Notes: This table reports difference-in-difference estimates for the impact of PPP on establishment level employment. Data on establishment employment and PPP loan applications are from Dun & Bradstreet. The sample consists of establishments operational as of October 2019 that meet our sample selection criteria. For all regressions, the pre-treatment period is November-March and the post-treatment period is April-August. Each column uses a different treatment and control group, where “X-Y” indicates the size of the establishment by employment in February, “loan” indicates that we observe that the establishment applied for a PPP loan of at least \$150,000, “no loan” indicates the opposite, and “all estabs” indicates that we include all establishments in the analysis sample regardless of whether they applied for a loan. All regressions include state, month, and 2-digit SIC industry code fixed effects as well as state-by-month and industry-by-month fixed effects. Standard errors are clustered at the state level. Coefficients and standard errors are multiplied by 100 for ease of interpretation. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Estimating the Effect of PPP Loans on the Probability an Establishment Goes Out of Business (D-in-D Estimates)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|-----------------------|-----------------------|-----------------------|-----------------------|---------------------|-----------------------|
| Dependent variable: Out of Business = 1 | | | | | | |
| Treated x Post x 100 | -0.237*** (0.0222) | -0.236*** (0.0224) | -0.616*** (0.0836) | -0.471*** (0.0853) | 0.0562 (0.124) | -0.219** (0.0683) |
| Treatment | 1-500; loan | 1-250; loan | 251-500; loan | 1-500; loan | 400-475; all estabs | 1-500; all estabs |
| Control | 1-500; no loan | 1-250; no loan | 251-500; no loan | 501-1,000; no loan | 525-600; all estabs | 501-1,000; all estabs |
| Observations | 81,625,920 | 81,262,585 | 363,335 | 3,982,131 | 111,512 | 81,745,730 |
| R-squared | 0.00805 | 0.00804 | 0.02154 | 0.00344 | 0.0166 | 0.00789 |

Notes: This table reports difference-in-difference estimates for the impact of PPP on establishment level employment. Data on establishment employment and PPP loan applications are from Dun & Bradstreet. The sample consists of establishments operational as of October 2019 that meet our sample selection criteria. For all regressions, the pre-treatment period is November-March and the post-treatment period is April-August. Each column uses a different treatment and control group, where “X-Y” indicates the size of the establishment by employment in February 2020, “loan” indicates that we observe that the establishment applied for a PPP loan of at least \$150,000, “no loan” indicates the opposite, and “all estabs” indicates that we include all establishments in the analysis sample regardless of whether they applied for a loan. All regressions include state, month, and 2-digit SIC industry code fixed effects as well as state-by-month and industry-by-month fixed effects. Standard errors are clustered at the state level. Coefficients and standard errors are multiplied by 100 for ease of interpretation. *** p<0.01, ** p<0.05, * p<0.1

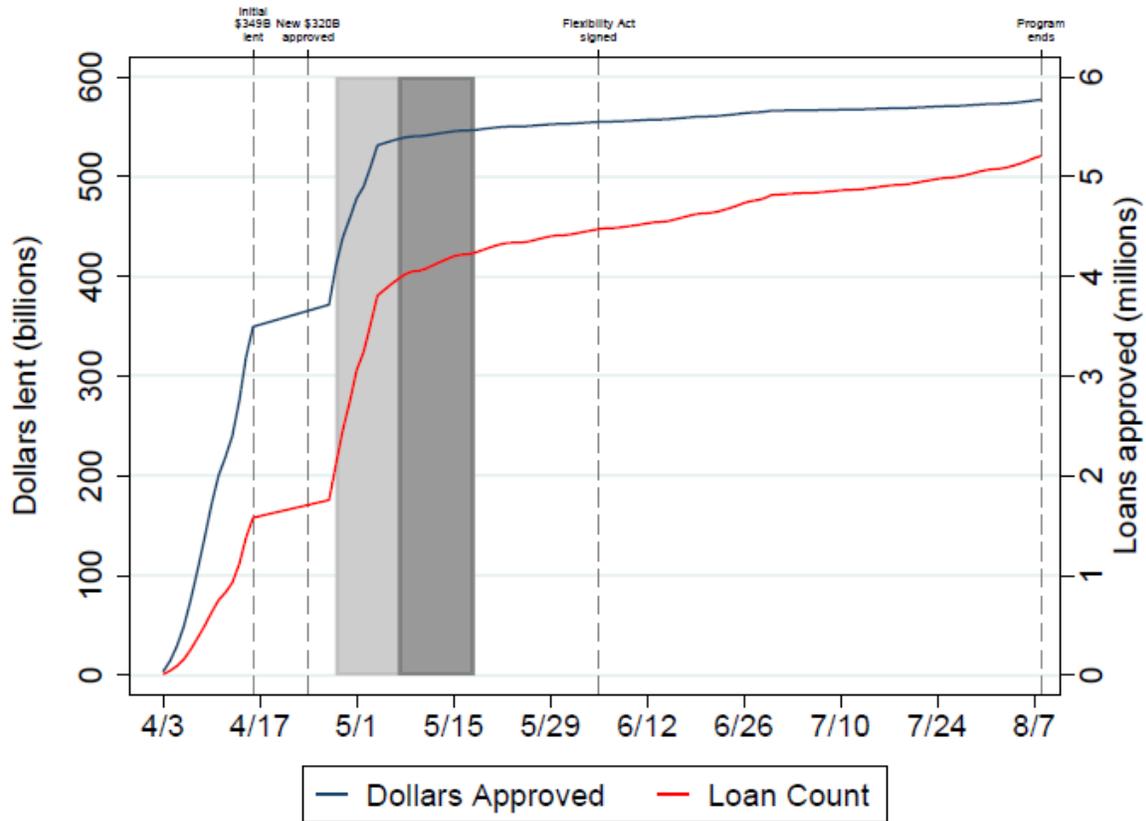


Figure 1: Cumulative number of PPP loans and dollars approved, April 3-August 8. This figure displays cumulative loans and dollars lent during the operation of the PPP program calculated from the microdata provided by the SBA and Treasury Department as of August 20, 2020. Cumulative dollars lent are overstated in the microdata due to using the midpoints of loan ranges provided for loans greater than \$150,000. The shaded areas represent a period of uncertainty over audits and the safe harbor deadline. The lightly shaded area covers the total period of uncertainty over audits from April 28 (audits announced) to May 18 (final deadline to return funds under safe harbor provision). The darker area covers the period of uncertainty over the safe harbor deadline from May 7 (the original deadline) to May 18 (the final deadline).

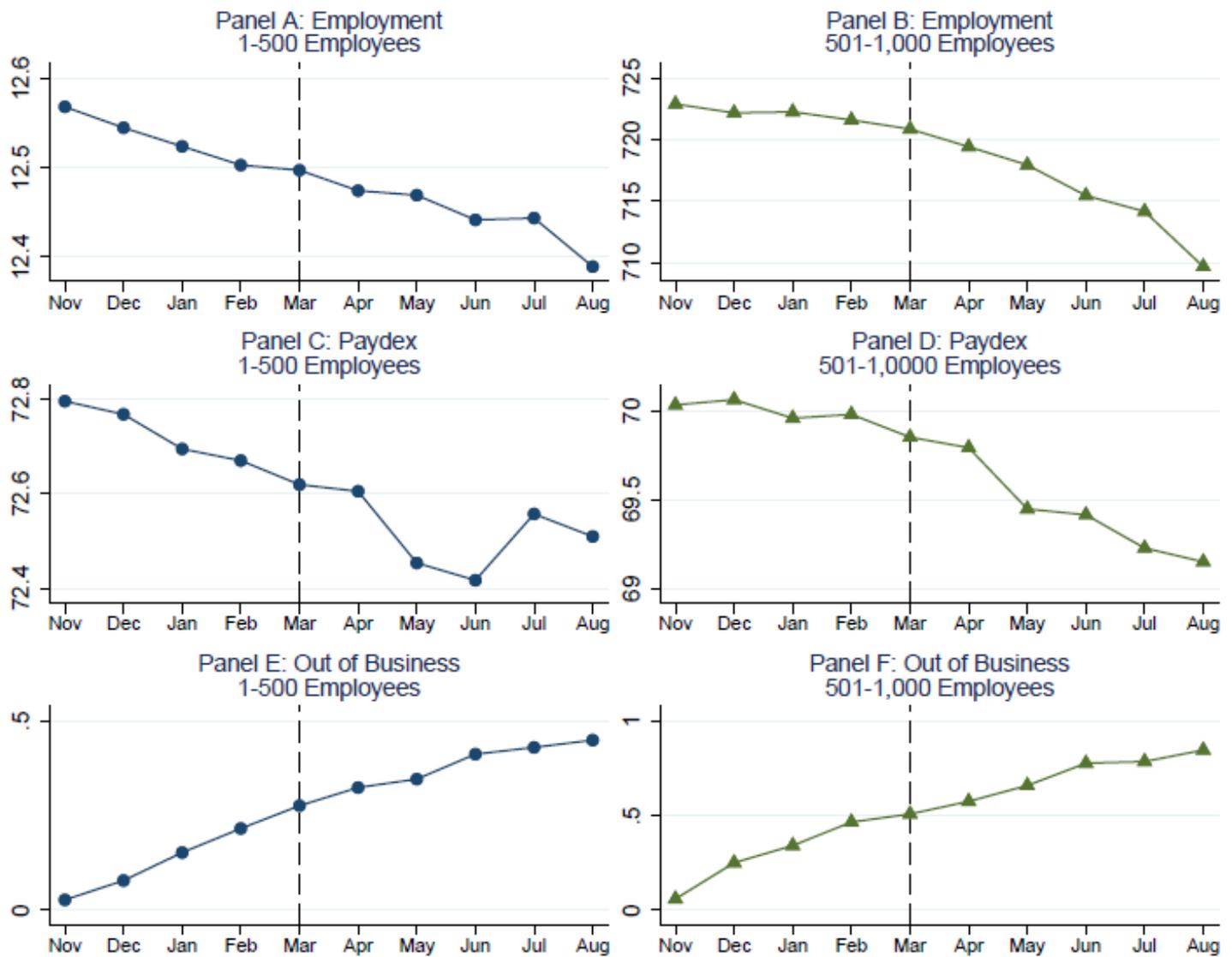


Figure 2: Authors' calculations of average establishment employment, Paydex scores, and out of business rates by month. This graph shows average employment, Paydex score, and out of business rates from November 2019 to August 2020 for establishments with 1-500 employees and 501-1,000 employees. Establishments are assigned to an employment-size group using February 2020 employment. Panels A, C, and E include establishments with 1-500 employees. Panel B includes all establishments with 501-1,000 employees.

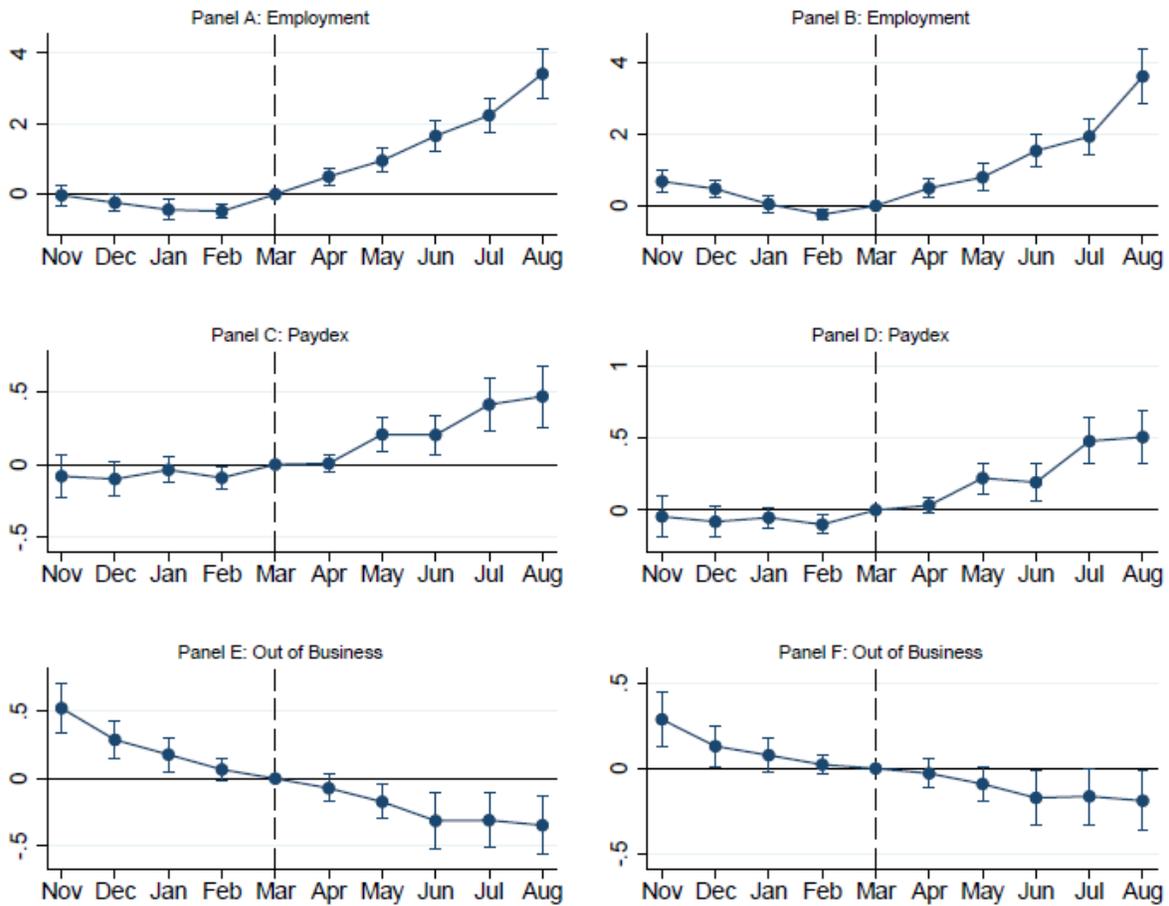


Figure 3: Graphs from Event Study Regressions. This graph shows the results from event study regressions in equation (2) examining the impact of the Paycheck Protection Program on establishment employment, financial health, and survival. Panels A, C, and E examine PPP’s effect on employment, credit scores, and survival rates for establishments with 1-500 employees that applied for a PPP loan of \$150,000 or more compared to establishments with 501-1,000 employees. Panels B, D, and F examine the effect of PPP eligibility on the same outcomes, comparing all establishments with 1-500 employees to all establishments with 501-1,000 employees (*i.e.*, dynamic intent-to-treat effects). Establishments are assigned to an employment-size group using February employment. Coefficients and standard errors for Panels A, B, E, and F are multiplied by 100 to ease interpretation. Error bars represent 95 percent confidence intervals.

Appendix: Additional Tables and Figures

Table A1: Programs Supporting Employment in Response to COVID-19 in OECD Member States

| <u>Country</u> | <u>Name</u> | <u>Type</u> | <u>Eligibility</u> | <u>Program Description</u> | <u>Duration of Subsidy</u> |
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| Australia | Job Keeper Employers | Wage Subsidy | Aggregated turnover of less than A\$1 billion (for income tax purposes) and estimate turnover likely to be reduced by 30 percent or more compared to previous year OR Aggregated turnover of more than A\$1 billion and estimated turnover likely to be reduced by 50 percent compared to previous year. From September 28, businesses will need to demonstrate that they have met the relevant decline in turnover test for the preceding quarter. They will have to do the same on November 3, 2021. Employers must retain workers. | Eligible employers will be paid A\$1,500 (US\$1,076) per fortnight per eligible employee. Eligible employees will receive, at a minimum, A\$1,500 per fortnight, before tax, and employers are able to top-up the payment. Restricted to workers employed in March 2020. From September 28, the payment rate will be A\$1,200 (US\$860) per fortnight for employees working for 20 hours or more a week and \$750 (US\$538) per fortnight for employees working less than 20 hours a week. From November 4, 2021, the payment rate for the two groups reduces to A\$1,000 (US\$717) and A\$650 (US\$466) per fortnight respectively. The program began on March 30, 2020 and is scheduled to end on March 28, 2021. The subsidies are scheduled to last 12 months. | 12 months |
| Austria | Corona-Kurzarbeit (Corona short-time work) | Wage Subsidy | Short-time work is independent of the size of the company and possible regardless of the branch. Public organizations, Bund and Länder, political parties and the local community institutions are excluded from this subsidy. Employers must retain workers. | The employee receives 90% of wages if the gross wages received previously were up to EU1700 (US\$2005) per month, 85% if the gross wages received previously were between EU1700 and EU2685 (US\$3167) per month, and 80% for if gross wages were previously greater than EU2685 per month. Working time reduced by up to 10%. Phase 3 begins October 1. After this date, working time must have | 3 months with further 3 month extension if specific requirements are met |

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| | | | | reduced between 30% and 80%. This program began on June 1, 2020, and is currently scheduled to end on March 31, 2021. | |
| Belgium | Temporary Unemployment Scheme | Wage Subsidy | Workers and employees, temporary workers, contractual staff and apprentice. Employers must retain workers. | 70 percent (up from the usual 65 percent) of their average capped wages (capped at EUR,754.76 (US\$3,249) per month) plus a supplement of 5.63 euros per day. This program began on February 1, 2020, and is currently scheduled to end on August 31, 2020. | 6 months |
| Canada | Emergency Wage Subsidy | Wage Subsidy | Employers with a CRA payroll account, that have experienced a reduction in revenue (15% or more in March, 30% in April/May, or any level of decline after June). Employers must retain workers. | Wage subsidy to rehire workers previously laid off due to COVID, prevent further job losses. The subsidy is 75 percent of employee wages up to CA\$847 (US\$639) per week per employee. Since June, subsidies are now proportional to the experienced revenue decline. A "base subsidy" will be paid to employees of employers with any level of revenue decline while employers that have experienced revenue decline greater than 50% are entitled to a "top-up subsidy". "Base subsidy" rate is defined in table in the link (reducing each month). This program began on March 15, 2020, and is currently scheduled to end on November 21, 2020. | 8 months |

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| Chile | Ley de Ingreso Mínimo Garantizado (Guaranteed Minimum Income) | Wage Subsidy | Dependent workers subject to working hours of 30-45 hours per week who receive a gross salary less than CH\$384,363 (US\$486) and who belong to the most vulnerable 90% of the population according to the Social Registry of Households. Employers must retain workers. | Anyone earning below CH\$301,000 (full-time) receives the maximum subsidy. The subsidy amount decreases as gross salary increases up to CH\$384,363. The monthly amount of the subsidy will be calculated proportionally for part-time workers. Maximum subsidy of CH\$59,200 (US\$75). This program began on April 1, 2020, and is currently scheduled to end on December 31, 2023. | 44 months |
| Colombia | Programa de Apoyo al Empleo Formal (Formal Employment Support Program) | Wage Subsidy | Any business that has had a 20% reduction in turnover or sales, when compared with April 2019 and as long as the business has not received benefits from the Formal Employment Support Program (PAEF) of this decree on four or more occasions. Employers must have been incorporated before November 1, 2020, and have an inscription in the commercial register. Employers must retain workers. | The national government will grant monthly a contribution per employee corresponding to 40% of the minimum wage. This corresponds to CO\$351,000 pesos (US\$ 93.50). This program began on May 8, 2020, and is currently scheduled to end on September 8, 2020. | 4 months |
| Czech Republic | Wage Subsidy Antivirus employment protection program | Wage Subsidy | Companies must continue to pay all wages and benefits and need to prove their problems are due to COVID-19. Employers must retain workers. | Support is 80% of wages up to a maximum of CZK 39,000 (US\$1,757) per month for employees who cannot work because of a quarantine or a closure/restriction ordered by authorities. Support is 60% capped at CZK 29,000 (US\$1307) per month when an employer's business is affected in a different way by the coronavirus outbreak (reduced demand, unavailability of supply). This program began on March 12, 2020, and is currently scheduled to end on August 31, 2020. | 5 months |

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| Denmark | Wage Subsidy L141 | Wage Subsidy | Companies where at least 50 employees or 30 percent of the total workforce had their employment terminated due to COVID-19. Employers must retain workers. | State pays up to 75% of employees' salaries for full-time salaried employees and up to 90% of salaries for hourly workers at a maximum of DKK 30,000 (US\$4743) per month. Companies are required to pay the rest of an employee's salary in full. The company may be covered by the scheme for up to 3 months at most. This program began on March 9, 2020, and is currently scheduled to end on August 29, 2020. | 5 months |
| Estonia | The Estonian Unemployment Insurance Fund | Wage Subsidy | Must satisfy 2 of the following 3 conditions: Employer must have suffered at least a 30% decline in turnover or revenue for the month they wish to be compensated for in comparison to the same month the previous year. OR the employer has cut over 30% of employees' wages by at least 30%. OR the employer is not able to provide 30% of their employees with the agreed workload. (More stringent requirements added in June 2020: turnover must have decreased by 50% in June, tax debt must have been paid by the employer, and the previous conditions must now apply to 50% of the employer's workforce compared to 30%). Employers must retain workers. | The Estonian Unemployment Insurance Fund will compensate 70% of the average wage from the last 12 months but no more than EU1,000 (US\$1,176). Total cost of the decreased wages compensation measure is EU250 million. Employers must pay at least EU150 (\$US176) to each employee. (Subsidy reduced to 50% up to EU800 (US\$941 starting June 2020). This program began on March 1, 2020, and ended on June 30, 2020. | 3 months |
| Finland | Business Cost Support | Forgivable Loans | Support will be paid to those sectors of industry where turnover in April 2020 has decreased by at least 10% compared to March-June 2019. If a company belongs to such a sector of industry, a further precondition is that the company's turnover in April-May 2020 has decreased by over 30% when compared to its turnover in March-June 2019. Employers must retain workers. | The business cost support would be at maximum EUR500,000 (US\$589,713) for two months. Business cost support less than EUR 2,000 (US\$2,359) would not be paid, as such a low sum would not be relevant in preventing bankruptcies. The amount of business cost support granted depends on the magnitude of the applicant company's fixed costs and labor costs. Fixed costs entitling to compensation could amount to no more than 50% of the particular company's average | 2 months |

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| | | | | turnover during the comparison period. This program began on July 1, 2020, and is currently scheduled to end on August 31, 2020. | |
| France | Chômage Partiel (Partial Unemployment) | Wage Subsidy | Businesses must have reduced hours or have closed part or all of their operations. Employers must retain workers. | The employer must pay the employee compensation corresponding to 70% of his gross salary per hour worked, i.e. approximately 84% of the hourly net salary. This compensation cannot be less than €8.03 per hour off work. If the employee is on minimum wage, they will be reimbursed 100%. The company will be fully reimbursed by the State, for salaries up to EU6,927 (US\$8149) gross monthly (4.5 times minimum wage). This was a pre-existing program before the COVID-19 pandemic and thus has no scheduled end date. | Maximum period of 12 months, renewable (maximum was 6 months pre-covid-19) |
| France | Activité Partielle de Longue Durée (APLD) (Long Term Partial Activity) | Wage Subsidy | Businesses that have reduced hours or closed part or all of their operations. Employees cannot be furloughed more than 40 percent of their total work time and there must be an agreement with workers unions. | Businesses that register for this scheme will pay their employees 70% of their wages within the 4.5 times the minimum wage limit. The employer will be reimbursed 60% by the government for agreements concluded before October 1, 2020. Reimbursement rates will be 56% for agreements after the October 1 deadline. This program began on July 1, 2020, and is currently scheduled to end on June 30, 2022. | 24 months |

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| France | Activité Partielle de droit commun (Partial Activity under Common Law) | Wage subsidy | Businesses must have reduced hours or have closed part or all of their operations. Employees can be furloughed for more than 40 percent of their total work time. Employers must retain workers. | Businesses that register for this scheme will see the state reimburse 72 percent of a furloughed employee's net salary (unless they are on minimum wage of which they get 100 percent reimbursed) but the state will not cover more than 70 percent of the current 4.5 times the minimum wage (SMIC). NOTE: From July, this pre-existing system will coexist with long-term partial activity, as that system is less restrictive. This program began on June 1, 2020, and is currently scheduled to end on June 30, 2022. | 6 months (can be renewed up to 4 times for max 2 years (APLD adaption July 20)) |
| Germany | Expanded Kurzarbeitergeld (Expanded Short-Time Work Allowance) | Short-Time Work Subsidy | At least 10 percent of workers have hours cut by more than 10 percent (pre-covid-19, to qualify for Kurzarbeitergeld, 30 percent of the workforce had to be affected). Employers must retain workers. | Government subsidizes 60 percent of lost wages for workers on short-time work allowance (67 percent for workers with children). After 4 months, this increases to 70 percent (77 percent for workers with children). After 7 months, this increases to 80 percent (87 percent for workers with children) Months are counted from March 1st 2020. This program began on March 1, 2020, and is currently scheduled to end on December 31, 2020. | 12 months |
| Greece | SYN-ERGASIA | Short-Time Work Subsidy | Businesses will be able to participate regardless of size or activity, as long as they can show a loss of 20% turnover in the month that they join the program. Employers may only reduce the hours of full-time salaried employees who were active May 30, 2020. Employers must retain workers. | Employers may reduce unilaterally all or part of their employees' weekly work hours by up to 50%. The state will cover 60% of the employee's net salary for the time during which the employees do not work. If, after this wage subsidy, the wage does not reach minimum wage, the deficit will be further subsidized by the government. This program began on June 15, 2020, and is currently scheduled | 4 months |

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| | | | | to end on October 15, 2020. | |
| Hungary | Short-time work subsidy | Short-Time Work subsidy | Employer and the employee can agree on reduced working time (minimum 25 % but maximum 85 % of original working time). Employer must have evidence that (i) the difficulties in the business are directly related to the COVID-19 pandemic and the state of emergency; (ii) retention of the employees is in the interest of the national economy. Employers must retain workers for the duration of the subsidy plus at least one month after the subsidy ends. | 70 percent of lost salary up to HUF 214,130 (US\$730) per month (twice the minimum wage). This program began on April 16, 2020, and ended on July 16, 2020. | 3 months |
| Iceland | | Wage Subsidy | Those who are under threat of losing their jobs will become eligible for unemployment benefits, which allow them to move to part time hours for their employer and claim additional support from the Government. The benefit package is open for those who cut back to as low as 25% of their previous employment hours or salary. Self-employed and freelancers are also eligible for the benefit. Employers must retain workers. | The Government of Iceland has committed to allowing part-time workers to claim up to 75 percent of unemployment benefits up to a combined amount of ISK 700,000 (US\$5109) per month. Government will cover 50% of benefits after June. Companies experiencing a 75% or greater decline in revenue are able to access more government assistance to cover up to 85% of wages. This program began on March 21, 2020, and is currently scheduled to end on August 31, 2020. | 5 months |
| Ireland | Temporary Wage Subsidy Scheme (TWSS) | Wage Subsidy | Introduced for employers in all sectors who retain staff on payroll; some of the staff may be temporarily not working or some may be on reduced hours or reduced pay. Employers must be able to demonstrate a 25 percent reduction in turnover and employers must retain workers. | (System preceding May 4 2020) €410 per employee (US \$462). (System from May 4 2020 onwards) The maximum subsidy payable is calculated by reference to the employee's net weekly pay for November and February 2020. The subsidy is tapered to ensure that the net weekly pay (employer's contribution and wage subsidy) of the employee does not exceed €960 net per week. This program | Initially 12 weeks, starting from 26 March 2020. Extended to 12 months |

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| | | | | began on March 26, 2020, and is currently scheduled to end on August 31, 2020. | |
| Ireland | Employment Wage Subsidy Scheme (EWSS) | Wage Subsidy | Employers and new firms in sectors impacted by COVID-19 whose turnover has fallen 30%. If a worker is already on TWSS, they must stay on that until it ends August 31 before applying for EWSS. Employers must retain workers. | Flat rate subsidy: Rate of EU203 (US\$239) per week for employees earning between EU203 and EU1,462 (US\$1719) per week. Rate of EU151.50 (US\$178) for employees earning between EU151.50 and EU202.99 per week. No subsidy is paid for employees paid less than EU151.50 or more than EU1,462 per week. This program began on July 1, 2020, and is currently scheduled to end on March 31, 2021. | 8 months |
| Israel | The Economic Assistance Program | Wage Subsidy | 1) Any self-employed individuals with taxable income in 2018 between 24,000 (US\$7,041) to 240,000 NIS (US\$70,411), and with a 25% decrease in turnover during March-April compared to the same period in 2019. 2) Any workers on unpaid leave. | 1) receive a grant up to 6,000 NIS (US\$1,760) 2) Workers on unpaid leave from their employer are eligible to claim up to 80% of their last salary from the Israeli Employment Service. This program began on May 8, 2020, and is currently scheduled to end on June 30, 2021. | 14 months |
| Italy | Wage Supplementary Fund | Wage Subsidy | Employers who suspend or reduce their business activities in 2020 as a result of the COVID-19 pandemic. Employers must retain workers. | 80 percent of employees' wages up to a maximum of EU1,300 (US\$1529). This program began on February 23, 2020, and is currently scheduled to end on August 31, 2020. | 14 weeks but can be extended to 12 months |

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| Japan | Expanded Employment Adjustment Subsidies | Wage Subsidy | Any business that has seen a decrease in production or sales of more than 5% and has been affected by COVID-19. The business must submit a closure plan by June 30 2020. Businesses must still pay compensation for absence from work of no less than 60% of normal wages and employers must retain workers. | For small and medium sized employers, the government will cover 80% of the compensation for absence from work up to JPY 15,000 (US\$141) per day. Government will cover 90% if the employer does not lay off any employees. For large businesses, the government will pay employers 66 percent of the compensation up to the same limit with the covered percentage rising to 75% if they do not lay off any employees. (In the typical system pre-COVID-19, the ratios were 66 percent and 50 percent respectively). This program began on April 1, 2020, and is currently scheduled to end on September 30, 2020. | 5 months (further extensions being debated) |
| Japan | Safety Net for Financing Guarantee | Forgivable Loans | Monthly revenue has decreased by 20% | Loan guarantee for up to 280 million yen (\$2.62 million) | |
| Latvia | Downtime Subsidy | Wage Subsidy | Employers in 40 industries including sports, travel, transit, tourism and culture. Employers must retain workers. | 75 percent of their salaries but not more than EUR 700 (US\$821) a month (minimum wage). The program is expected to cost about €102m and cover 73,000 employees according to Economics Ministry estimates. This program began on May 1, 2020, and ended on June 30, 2020. | 2 months |
| Latvia | Special Wage Subsidy | Wage Subsidy | Employers in 40 industries including sports, travel, transit, tourism and culture. Employers must retain workers. | Employers can apply for wage subsidies of 50% up to a maximum of EUR 430 (US\$504). Each wages subsidy period lasts 4 months. Employers are only permitted to apply for wage subsidies for up to 50% of its employees but no more than 20 employees. Employment for each person receiving a wage subsidy must be guaranteed for 3 months | 4 months |

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| | | | | following the end of the subsidy. This program began on July 1, 2020, and is currently scheduled to end on December 31, 2021. | |
| Lithuania | The Economic and Financial Action Plan | Wage Subsidy | All employers can apply for the subsidy but they cannot require employees to perform work functions during the downtime. All employers that apply for wage subsidies must maintain no less than 50 percent of jobs for 3 months or 6 months following the end of payment of wage subsidies depending on which subsidy the employer applies for (see Program Description). | The government will pay employers 90 percent of an employee's wage up to EUR 607 pre-tax (1x minimum wage). There is an obligation to maintain the employment status of the employee for 6 months with this subsidy. Or the government will pay employers 70 percent of an employee's wage up to EUR 910.5 pre-tax (1.5x minimum wage). There is an obligation to maintain the employment status of the employee for 3 months with this subsidy. Self-employed workers can apply for a flat rate subsidy of EUR 257 per month regardless of the number of self-employed activities they carry out. This program began on April 8, 2020, and will remain in place until the state of emergency and quarantine is ended by the Lithuanian Government. | 1 month (must renew each month but unlimited renewals) |
| Luxembourg | Chômage Partiel (Partial Unemployment) | Wage Subsidy | Companies and Organizations based in Luxembourg with an establishment authorization and affected by force majeure, COVID-19. Employers must retain workers. | 80% of workers' wages – up to 250 percent social minimum wage. Workers cannot be laid off. This program began on March 18, 2020, and is currently scheduled to end on December 31, 2020. | 9 months |
| Mexico | | Employment Guarantee | | No state workers will be fired. | |

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| Netherlands | Temporary Emergency Bridging Measure NOW | Wage Subsidy | Companies facing at least 20 percent turnover loss over a 3 month stretch between March 1, 2020, and July 31, 2020. This was extended to a period of four months under version 2.0 running from June 6, 2020. Those four months can be between March 1 and November 30, 2020. Employers must retain workers. | If the turnover loss is 100 percent, the compensation will amount to 90 percent of wages. If loss is 50 percent, compensation will be 45 percent. If loss is 25 percent, the compensation will amount to 22.5 percent of wages. No layoffs allowed. Compensation is capped at EU 9,538 (US\$11,188) per month. This program began on March 1, 2020, and is currently scheduled to end on September 30, 2020. | Original 3 months extended to 6 months |
| New Zealand | COVID-19 Wage Subsidy | Wage Subsidy | (REGULAR SUBSIDY): Employers with a 30 percent or more decline in actual or predicted revenue during the month due to COVID-19. Then updated by removing the 30 percent requirement. Instead became any employers with a predicted or actual decline in revenue due to COVID-19. The regular subsidy ended June 10, 2020. The extension until September 1, 2020, requires demonstration of at least a 40% drop in revenue. Employers must retain workers. | Flat rate: NZ \$585.80 (US\$385) for employees working 20 hours or more per week before the crisis (full-time); NZ \$350 (US\$230) for employees working less than 20 hours per week (part-time). Maximum of NZ\$150,000 (US\$98,655) per firm. This program began on March 18, 2020, and is currently scheduled to end on September 1, 2020. | 12 weeks. Additional 8 weeks if employers can demonstrate a 40% drop in revenue. |
| Norway | Employee Retention Credit | Wage Subsidy | Companies that have more than a 10 percent drop in turnover and non-profit organizations, associations and foundations for the purpose of taking back their own lay-offs can apply for support. The scheme covers all employees, including apprentices. Employees must have been laid off or partially laid off as of May 28 2020 but then taken back from redundancy at the beginning of July. Employers must retain workers. | For companies with more than a 30 percent revenue drop, they receive NOK15,000 per person who has been taken back from redundancy. For companies with a revenue drop between 10 percent and 30 percent, the aid amount per person taken back is (fall in turnover in percent - 10 percentage points) * 75,000. This program began on July 1, 2020, and is currently scheduled to end on August 31, 2020. | 2 months (potential to extend beyond August) |

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| Poland | Anti-Crisis Shield-Wage Subsidy | Wage Subsidy | The employee must have been fully or partially laid off as of 28 May 2020. Business must have experienced more than 15% decline in turnover compared to previous year. Employers must retain workers. | For economic downtime, subsidy is 50 percent of minimum wage, EU 290 (US\$340). For reductions of working time at least 20 percent but less than part time, up to 50 percent of employee's salary, but no more than 40 percent of the average monthly salary compared to the previous quarter. Workers cannot be laid off. For micro, small, and medium sized businesses, a subsidy of either 50, 70, or 90 percent of minimum wage per employee can be given by the government if total sales revenue declined by 30, 50, or 80 percent respectively compared to the two corresponding months in 2019. This program began on March 31, 2020, and ended on June 30, 2020. | 3 months |
| Portugal | Simplified Layoff | Wage Subsidy | Companies in temporary economic difficulties (i.e. that cease their activity due to a break in the supply chain as well as those whose business records a 40 percent drop in turnover compared to the same period in 2019). Employers must retain workers for at least 60 days after the subsidy ends. | Where normal working hours are reduced, the employee's salary is proportionally reduced. However, the employee will be entitled to a minimum amount equal to 2/3 of their normal gross remuneration, or the value of the national minimum wage, EUR 635 (US\$748) per month, whichever is higher, up to three times the NMW (EUR 1,905.00, (US\$2,245)). This compensation is supported by Social Security (70%) and the employer (30%). This program began on March 9, 2020, and is currently scheduled to end on September 30, 2020. | 3 months (renewed monthly) (may apply for a 4th month with "exceptional circumstances") |

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| Slovak Republic | None | Wage Subsidy | Employers who closed or restricted their business operations due to the decision of the public health authority or any employers who had sales reduce by more than 20%. Employers must retain workers. | 80% of average monthly salary up to EUR 1100 per employee per month for employees who are unable to work. Subsidies for self-employed people whose sales declined during the state of emergency is 540 EUR per month. For employers with sales reductions greater than 20% but who do not close down, compensation for lost income due to reduced sales is as follows: >20% - EU180, >40% - EU300, >60% - EU420, >80% - EU540 per month. This program began on March 13, 2020, and is currently scheduled to end on March 31, 2021. | 12 months |
| Slovenia | Wage Co-financing Regime | Wage Subsidy | Workers who are temporarily laid off and workers unable to come to work because of the COVID-19 pandemic. Employers must retain workers. | To employers who cannot provide work to more than 30% of their employees and send them home to wait for work. In this case, the state will reimburse 40% of the salary costs to the employer, while the employer bears 60% of the cost. The maximum amount of reimbursement is limited to the maximum amount of compensation for unemployment (currently EUR 892.50 gross). If a healthy employee is ordered to stay in quarantine and cannot work from home. In this case, the state will reimburse to the entire cost of the employee's salary compensation, i.e. 80% of the employee's average salary in the last three months. This program began on April 2, 2020, and ended on June 15, 2020. | 2 months |

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| South Korea | Employment Maintenance Subsidies | Wage Subsidy | Qualifications for the subsidy include the following: maintaining the current employees while exercising “rescue” measures for at least one month, such as, (a) a temporary suspension of business while granting paid leave to the employees; or (b) reduced employee work hours which are in excess of 20% of the total working hours. Employers must retain workers. | Increases employment retention subsidies from 66% of wages to 90% for 3 months, April to June (while maintaining the cap of KRW66,000/employee/day (US\$56)). Large firms are subject to the 66% threshold. Employment promotion subsidy for small and medium sized enterprises introduced from July 27 until December 31 for up to 1 million KRW (US\$845) per hired person. This program began on April 1, 2020, and ended on June 30, 2020. | 3 months |
| Spain | Expansion of ERTE Program to businesses affected by Coronavirus | Wage Subsidy | All workers affected by a reduction in working hours or temporary suspension of working contract. Company must prove reduction in workload due to force majeure or economical, technical, organizational or productive causes. Employers must retain workers for at least 6 months after the program ends. | In the case of total ERTES for causes of force majeure, where all employees have been sent home, companies with fewer than 50 workers will receive tax exemptions of 70% up to July, 60% in August and 35% in September. If a company has more than 50 workers, it will be relieved of paying 50% of employer contributions up to July, 40% in August and 25% in September. In the case of partial ERTES, where some workers have returned, exemptions also apply. In businesses with fewer than 50 workers, companies will receive exemptions of 60% for employees who have returned to work and 35% for those who remain suspended. In businesses with more than 50 workers, the rate is 40% and 25%, respectively. This program began on March 17, 2020, and is currently scheduled to end on September 30, 2020. | 6 months |

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| Sweden | Short-Time Work Allowance | Short-Time Work Subsidy | Companies that can show temporary and serious financial difficulties in coping with the COVID-19 pandemic. Newly hired employee (less than 3 months) are not encompassed in the support. Employers must retain workers. | Subsidy of 15% of employee pay with a 20% reduction of working time, 30% with a 40% reduction of working time, 45% with a 60% working time reduction, and 60% with an 80% working time reduction (this most serious case can only be applied for May, June and July). Maximum support SEK 44,000 (US\$5,066) per person/per month. This program began on March 16, 2020, and is currently scheduled to end on December 31, 2020. | 6 months with extension of 3 months until end of December 2020 possible |
| Switzerland | Expansion of Chômage Partiel | Wage subsidy | Employers affected by COVID-19 send request to local canton for STW benefits. Apprentices and temporary workers are included. Employers must retain workers. | Subsidy covers 80 percent of workers lost earnings capped at CHF12,350 (US\$13,556) per month. Workers cannot be laid off. For example, if an employer has to reduce the working time to 50%, the employer continues to pay the full salary for the 50% of the time worked, but only 80% of the salary for the 50% of the time not worked. This part is reimbursed by the unemployment fund. This program began on March 20, 2020, and is currently scheduled to end on March 1, 2021. | 12 months |
| Turkey | Short Labor Pay | Wage Subsidy | Firms that reduced working hours or halted operations because of the outbreak. Employers must retain workers. | Firms can force workers to take unpaid leave and the worker will receive 1,170 TL (\$180) per month. For firms that reduced working hours, a Short-term Work Allowance provides 1,752 TL/month (around \$271) for those that receive minimum wage. Beyond that the government will pay 60 percent of staff salaries for 3 months within the range of 1752 TL and 4381 (\$640) TL (1.5x minimum wage) per month. This program began on March 15, 2020, | 4 months |

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| | | | | and ended on July 31, 2020. | |
| United Kingdom | Coronavirus Job Retention Scheme | Wage Subsidy | All UK employers with Pay As You Earn (“PAYE”) payroll schemes that were opened and in use on or before February 28, 2020. Employers must retain workers. | From March 1, 2020 to July 31, 2020, the CJRS subsidizes up to 80% of employees’ “regular wage” or up to £2,500.00, whichever is lower, as well as all employer National Insurance Contributions (“NICs”) and pension contributions for the hours that employees are furloughed. For August 2020, the UK Government still will pay 80% of wages up to a cap of £2,500.00, but employers will be responsible for the NICs and pension contributions. In September 2020, the UK Government will pay 70% of wages up to a cap of £2,187.50 for the hours that employees are furloughed, and employers will pay NICs and pension contributions and will be required to make up the difference in employees’ wages. Finally, in October 2020, the CJRS grant will provide 60% of employees’ wages up to a cap of £1,875.00 for the hours that employees are furloughed, and employers will pay NICs and pension contributions and will be required to make up the difference in employees’ wages. This program began on March 1, 2020, and is currently scheduled to end on October 31, 2020. | 8 months |

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| United States | Paycheck Protection Program | Forgivable Loans | Small businesses according to guidelines from the Small Business Administration. Generally businesses with 500 employees or fewer. Employers must retain workers. | Small businesses can apply for a bank loan covering 24 weeks of expenses up to \$10 million with a 1 percent interest rate and 5-year repayment period, 60 percent of which must be spent on payroll. The loan is forgiven provided no layoffs occur or workers that were laid off prior to obtaining the loan are rehired. This program began on April 3, 2020, and ended on August 8, 2020. | 8 or 24 weeks |
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Notes: The program information in this table is current as of August 12, 2020 and is the authors' summary of information from various sources, including: International Labor Organization Appendix on Temporary Wage Subsidies; Lipson, Northend, and Alberzehl; Monitoring the Covid-19 Employment Response: Policy Approaches Across Countries; Harvard Kennedy School Malcom Weiner Center for Social Policy; Social Protection and Jobs Responses to COVID-19: A Real-Time Review of Country Measures.

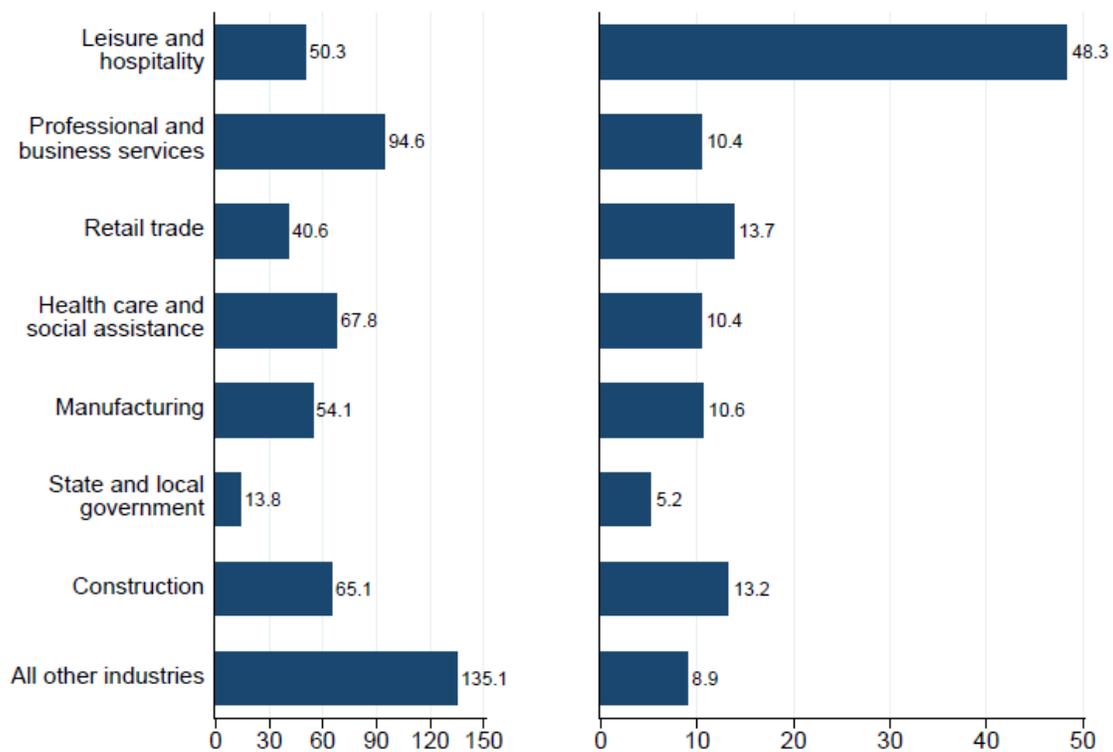


Figure A2: Total PPP Loans by Industry and Share of February 2020 Jobs Lost by April 2020. This figure displays PPP lending and job losses by industry. The left panel displays PPP loans in billions from April 3 to August 8 according to the SBA Paycheck Protection Program Report for August 8. The right panel displays job losses from February to April as a share of jobs in February. Employment data come from the BLS as of October 19, 2020.