RAND CORPORATION

Research Report

ANNA JEAN WIRTH, SYDNEY LITTERER, ELVIRA N. LOREDO, LAURA H. BALDWIN, RICARDO SANCHEZ

Keeping the Defense Industrial Base Afloat During COVID-19

A Review of Department of Defense and Federal Government Policies and Investments in the Defense Industrial Base

KEY FINDINGS

- We present a short, exploratory analysis summarizing federal and DoD investments in the DIB during the COVID-19 crisis and descriptive analysis of PPP data.
- DoD and the federal government made many investments in the DIB throughout the COVID-19 crisis to maintain financial solvency of struggling companies and to keep national security supply chains functional.
- The health of small businesses was a particular concern because these companies can have limited visibility in supply chains and are often more vulnerable to financial disruptions.
- The PPP offered financial assistance to small companies, and analysis of this data can provide insight into this group during the COVID-19 crisis.
- Of those DoD contractors that took advantage of the PPP, most were in the manufacturing sector and had fewer than 100 employees.
- The data suggest that the PPP reached many small businesses in the manufacturing sector, an important sector for national security supply chains and one that was hit especially hard by the COVID-19 crisis.

In March 2020, the spread of the coronavirus disease 2019 (COVID-19) pandemic in the United States caused the U.S. government to issue "stay-at-home" orders to limit the spread of the virus. This resulted in rapid changes in production because businesses paused operations or switched to telework. These changes were not unique to the United States and had repercussions that flowed across global supply chains. Immediately, concerns about the short- and long-term health of the Defense Industrial Base (DIB) and the stability of supply chains that are key to national security came to the forefront. This short, exploratory analysis considers the investments and policy changes that the Department of Defense (DoD) and the federal government made to support the DIB.

First, we review the investments made in the DIB in the first nine months of the crisis. Then, using descriptive analysis of open source data on the Paycheck Protection Program (PPP), we look closely at small businesses in

the DIB. This limited analysis is not an assessment of policy, nor does it provide recommendations to policymakers, but this report's insights might be of interest to those exploring ways to use publicly available data to understand some dynamics of the COVID-19 crisis in the DIB.

The Federal Government and Department of Defense Made Significant Investments in the Defense Industrial Base to Mitigate COVID-19 Impacts

Table 1 provides an overview of the federal and DoD actions related to COVID-19 impact mitigation. In March 2020, the Under Secretary of Defense for Acquisition and Sustainment (USD(A&S)) issued a memorandum elaborating on the designation of the DIB as critical infrastructure by the Department of Homeland Security's Cybersecurity and Infrastructure Security Agency (CISA). As a result of CISA-issued guidance on critical infrastructure, any industry and associated workforce that "enables research and development as well as design, production, delivery and maintenance of military weapons systems/software systems, subsystems, and components or parts, as well as purchased services to meet U.S. Military requirements" has been designated as critical infrastructure (Lord, 2020). This gave companies federal protection to maintain normal operations, even in the face of local restrictions.

In addition to the designation of the DIB as critical infrastructure, the U.S. government took steps to ensure the DIB's financial solvency. Some of the financial concerns about the DIB included costs related to implementing safety measures where work continued (e.g., social distancing, additional cleaning measures), production delays because of supply chain issues, and the ramifications of temporary closures or staff quarantines. On March 27, 2020, the House of Representatives passed the CARES Act, which provided $2 trillion to address the national emergency caused by the COVID-19 pandemic. The first prong of the CARES Act (Division A) was aimed at keeping workers paid and employed, enhancing the health care system, and stabilizing the economy. The second prong (Division B) consisted of $340 billion in emergency appropriations necessary to keep federal agencies operating, to clean facilities for the public, and to procure goods and services to combat COVID-19. Within the CARES Act, special provisions were made to support DoD. According to Taft, 2020, these included the following—all of which have now been accomplished:

- **Defense Industrial Base:** The Defense Industrial Base will be supported with $2.45 billion in new appropriations. The Defense Production Act [DPA] will add $1 billion to COVID-19 response, to include accessing materials necessary for national security and pandemic recovery.
- **Defense Working Capital Funds:** Collectively, the DoD and the Service Branches Defense Working Capital Funds will share $1.45 billion for emergency response purchases, to support production lines, supply chain, access to supplies and to stock military depots and labs. This includes funding to the Defense Logistics Agency (DLA), the DoD's combat logistics support agency that is well-positioned for defense surge needs and is likely to pivot in response to the COVID-19 response.
- **DoD Relaxations and Amendments:** Congress granted the DoD authority to waive certain procurement restrictions to increase cash flow with contractors, remove restrictions that are inconsistent

Abbreviations

CARES Act	Coronavirus Aid, Relief, and Economic Security Act
CISA	Cybersecurity and Infrastructure Security Agency
COVID-19	coronavirus disease 2019
DFC	U.S. International Development Finance Corporation
DIB	Defense Industrial Base
DoD	U.S. Department of Defense
DPA	Defense Production Act
NAICS	North American Industry Classification System
OMB	Office of Management and Budget
PPP	Paycheck Protection Program
USD(A&S)	Under Secretary of Defense for Acquisition and Sustainment

TABLE 1

Timeline of COVID-19 Response Activities Related to the Defense Industrial Base in the First Months of the Pandemic

	March 2020	April 2020	May 2020	June 2020	July 2020	August 2020
Federal actions	• Coronavirus Preparedness and Response Act • National emergency declared • Family First Act • DPA invoked • CARES Act	• Paycheck Protection Program		• Paycheck Protection Program Flexibility Act		
DoD actions	• OMB telework flexibility guidance • DIB workforce deemed "critical" memo • Deviation on progress payments memo	• Allows payments to contractors who cannot work because of COVID-19		• DoD and DFC memo of agreement to use $100 million of CARES Act funds to subsidize federal loans to industrial base		
Companies in DPA awarded Title III actions			• 5N Plus semiconductor • SolAero Technologies	• Austal USA • W International • Weber Metals • GE Aviation • American Woolen Company • Bethel Industries • GE Aviation • Sprit AeroSystems • Steel America • Allied Systems	• Forgemasters • AirMap • ModalAI • Skydio • Graffiti Ent. • Obsidian Sensors • Leo Labs • ArcelorMittal • Amfuel • Rolls-Royce • eMagin • Meggit-Rockmart • Urban Mining	• AQYR Technologies • Leonardo Electronics • Aero Turbine

SOURCE: Timeline events were sourced from DoD coronavirus timeline (DoD, 2020b).

NOTE: This table summarizes federal actions—key legislation related to the COVID-19 response and executive orders—and DoD actions related to supporting the DIB throughout the COVID-19 crisis. Note that only actions related to the DIB—not, for example, numerous actions related to vaccine development, COVID-19 testing, and other health care–related investments—are included here. The bottom row of the table summarizes companies in the DIB that were recipients of DPA Title III funding (note that this does not include the many COVID-19 health-related DPA projects). CARES Act = Coronavirus Aid, Relief, and Economic Security Act; DFC = U.S. International Development Finance Corporation; OMB = Office of Management and Budget.

with emergency response scenarios, and improve liquidity of contractors in the defense industrial base.

- **Undefinitized Contract Actions (UCAs):** The CARES Act provides heads of agency within the DOD, authority to waive limitations on the obligation of funds related to undefinitized contract action (UCAs) in response to COVID-19. The CARES Act also waives 10 USC 2326(b)(3), which under ordinary circumstances would require the contractor to submit its qualifying price proposal prior to spending more than 50% of the ceiling price (incurred cost limit) and would require the contracting officer to limit obligations to 75% of the ceiling price in order to ensure timely definitization. Both indicate a desire to give agencies increased flexibility during negotiations while contractors begin performance.
- **Other Transactions Authority (OTs or OTAs):** The CARES Act permits the delegation of authority to lower organizational managerial levels across defense agencies (except DARPA [Defense Advanced Research Projects Agency] and Missile Defense Agency) to expedite research and development on prototype projects. The provision is designed to improve defense industrial base liquidity, particularly among small businesses at DOD. In lieu of FAR [Federal Acquisition Regulation]-based contracts, OTs are expected to truncate industry response time to the pandemic.

Taken together, these provisions of the CARES Act in support of the DIB provided cash infusion and management flexibility to support the existing supply base. This flexibility was used throughout the DIB. The Navy, for example, is largely credited with avoiding disaster in the shipbuilding industry through its acceleration of contracts (Quigley, 2021). Larger original equipment manufacturers were also reported to have supported smaller suppliers by accelerating funding. For example, Lockheed Martin reported working closely with DoD to accelerate payments to vulnerable suppliers in the amount of $1.1 billion (approximately $300 to $500 million per week) (Lockheed Martin, undated). Northrop Grumman's website also reports accelerated payments to their suppliers and the beneficial effects of this action to tier 2 and tier 3 suppliers (Northrop Grumman, undated).

Through the DPA, DoD additionally made several investments supporting the DIB through the Title III program, which "is designed to create, maintain, protect, expand, or restore domestic industrial base capabilities" (DoD, Industrial Policy, undated). These investments are summarized in Table 1. In DoD releases, they are described as actions to help retain workforce capabilities in critical elements of the DIB. For example, in June 2020, DoD announced a $20 million investment in General Electric Aviation to support the Propulsion DIB, specifically to sustain more than 100 jobs representing highly specialized engineering capabilities (DoD, 2020a). From May through September 2020, DPA Title III investments were made across several sectors of the DIB, including body armor, space, cyber, and aviation.

Retrospective analysis in 2021 reports that the DIB has largely recovered from the crisis (Mehta and Insinna, 2021). Although long-term impacts remain unclear, particularly for small businesses, and some acquisition program delays remain, industry analysts report that most elements of the DIB are solvent partly because of the $4.6 billion investment from the Pentagon from the start of the pandemic through January 2021.[1]

The Paycheck Protection Program in the Defense Industrial Base

Throughout the COVID-19 crisis, the solvency of small businesses in the DIB—many of which are at lower tiers of the supply chain where DoD has limited visibility—was an important area of concern, and these small businesses were the target of many of the policies described in the previous section (e.g., waiving procurement restrictions, designating contractors as critical infrastructure) (Mehta and Insinna, 2021). PPP loans were another way that small businesses within the DIB were supported during the COVID-19 crisis. Because PPP loans were only offered to small companies, analysis of PPP loan data can help us learn more about the challenges faced by

this subset of the DIB during the first few months of the COVID-19 pandemic.

Small businesses,[2] as part of the CARES Act, were permitted to apply for loans backed by the Small Business Administration. The loans were originally meant to support small businesses for eight weeks to avoid furloughing or laying off employees. The PPP, Health Care Enhancement Act, and PPP Flexibility Act made changes to the CARES Act program for the loans, making possible loan forgiveness and allowing businesses more time to spend funds. The stimulus of December 2020 also made it possible for businesses to apply for a second PPP loan.[3] As of 2020, 60 percent of the loan must be used to fund payroll while the remaining portion of the loan can be used for other operational costs (Yin, 2021).

We analyzed PPP loan data through August 8, 2020, for all loans above $150,000 to learn more about the uptake of this program among small businesses in the DIB (U.S. Department of the Treasury, 2020).[4] We have limited available information on some important denominators for this analysis, such as how many total small businesses could reasonably be determined to be part of the DIB and how many jobs were at risk due to financial insolvency. However, we can use the available PPP data to get a sense of the scale of that program in the DIB and understand where those dollars were generally spent.

Table 2 shows an overview of loan sizes and the number of jobs protected for all businesses and fiscal year 2020 DoD contractors.[5] DoD contractors, as identified by whether they received a federal contract in fiscal year 2020,[6] represented less than 2 percent of the companies that received PPP loans, although on average, they received slightly larger loans than non-DoD contractors. Although we cannot calculate from the PPP data the percentage of small businesses in the DIB that took advantage of the PPP, survey data from the National Defense Industrial Association (an organization that is made up of a majority of defense contractors), which included small- and medium-sized businesses, found that, as of mid-2020, more than 50 percent of small businesses (<50 employees) and around 40 percent of midsize businesses (50–500 employees) reported taking advantage of the program (Matory and Kupperman, 2020). This suggests that, despite the overall small percentage of PPP loans that went to the DIB, it was still a program that had relatively high uptake among small- and medium-sized businesses in the DIB.

Figure 1 shows the total value of loans given, by industry, looking only at companies that had defense contracts in 2020. The manufacturing industry received a greater total value in loans than all other industries, with the potential exception of the professional, scientific, and technical services industry.[7]

To further explore these trends, we examined the total number of employees in the DIB affected by the PPP loans. PPP large loan applications require companies to report the number of jobs associated with the business. Using this reported data, Figure 2 shows the total number of employees across all the companies that received large PPP loans. Although it is difficult to assess the degree to which PPP loans prevented furloughing or laying off these employees—companies applying for PPP loans might have been able to avoid layoffs through other means—this provides a rough indicator for the number of jobs protected by the

TABLE 2
Paycheck Protection Program Loan Amount Summary

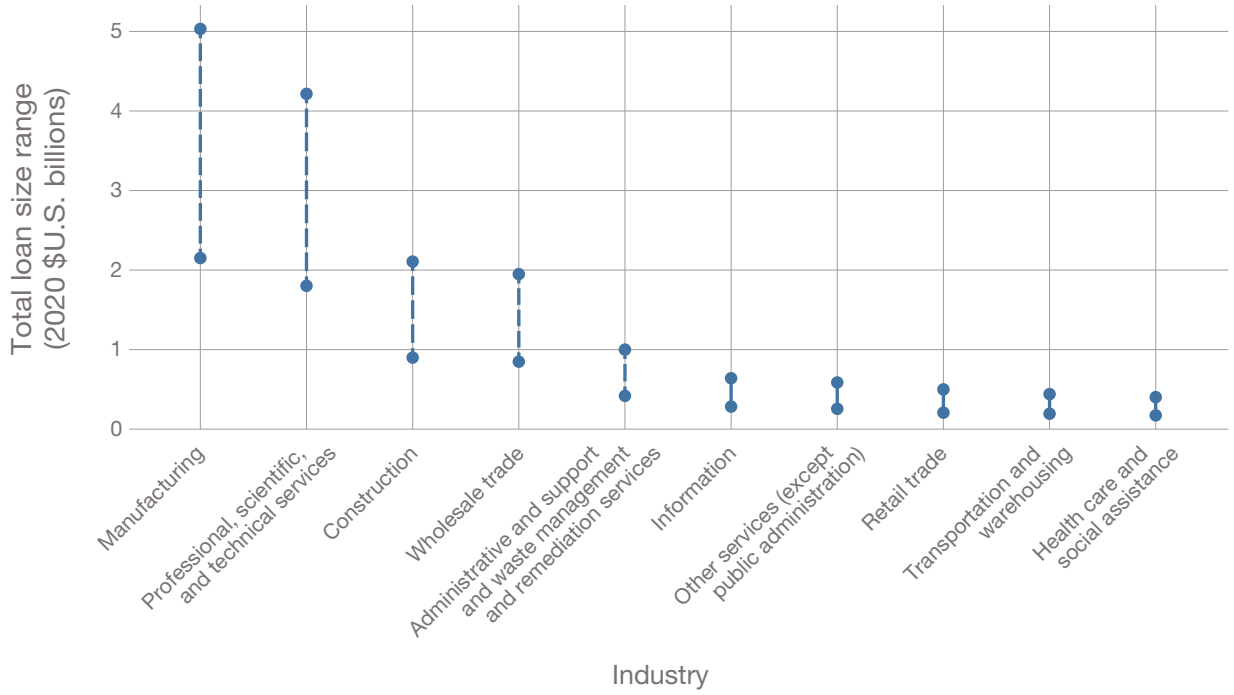
Metric	All Businesses	Fiscal Year 2020 Department of Defense Contractors
Number of loans received	662,515	11,824
Average number of jobs protected per loan	50.3	66.1
Average loan size (2020 U.S. dollars)	$382,273–$920,732	$651,066–$1,523,177

SOURCE: RAND analysis of U.S. government data (U.S. Department of the Treasury, 2020; and U.S. Department of the Treasury, Bureau of the Fiscal Service, 2021).

NOTE: Average loan size is given as a range because the value of each individual loan in the available data set was given as a range.

FIGURE 1

Total Value of Paycheck Protection Program Loans to the Defense Industrial Base, by Industry



SOURCE: RAND analysis of U.S. government data (U.S. Department of the Treasury, 2020; and U.S. Department of the Treasury, Bureau of the Fiscal Service, 2021).

NOTE: Average loan size is given as a range because the value of each individual loan in the available data set was given as a range. Some companies may be classified under multiple North American Industry Classification System (NAICS) codes, and their data would be reported for multiple industries in this representation.

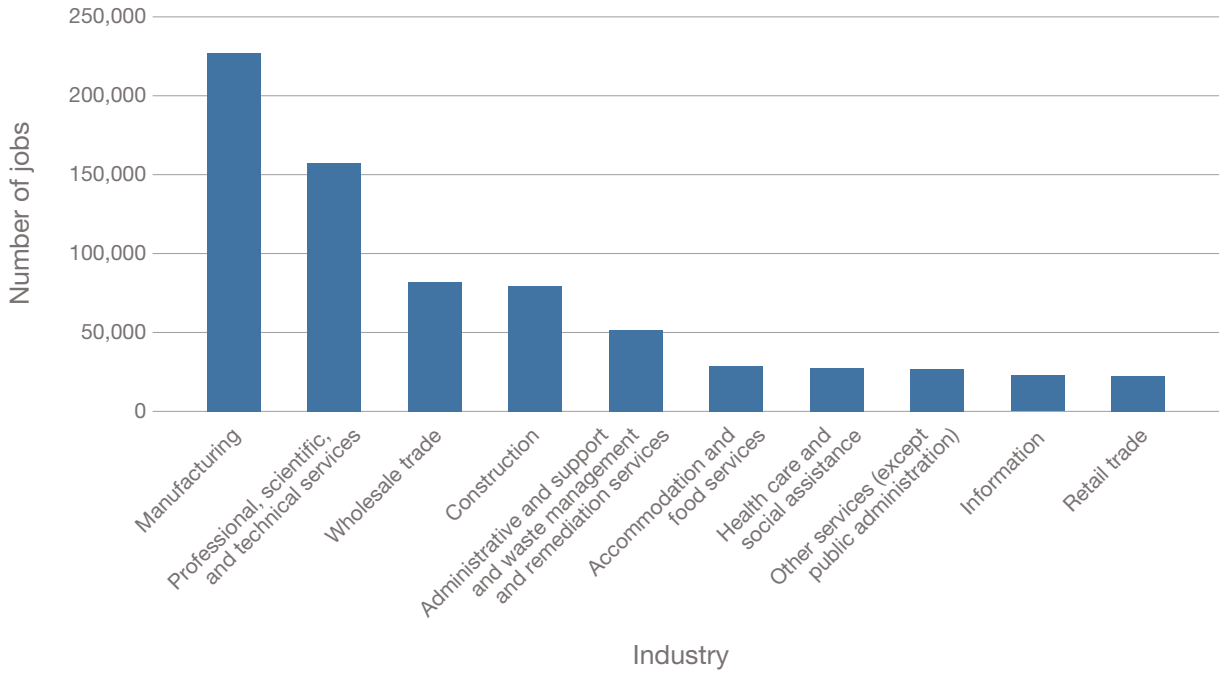
program within the DIB. The distribution of employees for all companies receiving PPP loans (DIB and non-DIB companies) is shown in Figure 3. As might be expected because of differences in the kinds of industries that dominate the DIB, the distribution of PPP loans by industry differs between the DIB-only and all-organizations data. The most notable takeaway from comparing Figures 2 and 3 is that DIB companies in the health care and social assistance and accommodation and food services industries had relatively fewer employees potentially protected by PPP loans than did those businesses in the broader U.S. economy. Figure 4 maps the DIB data shown in Figure 2 to show geographic trends in uptake.

Figure 5 shows the number of companies receiving PPP loans by their business size. Most organizations taking advantage of the program in the DIB have fewer than 100 employees. Conducting the same analysis for each industry, in isolation, yields a similar distribution of loans across companies of different sizes. The distributions for some industries—such as agriculture, forestry, fishing, and hunting; management of companies and enterprises; mining, quarrying, and oil and gas extraction; and real estate and rental and leasing—show some additional peaks, but loans were still primarily concentrated among companies with fewer than 100 employees. Loans to the health care and social assistance industry were the most evenly distributed by company size.

The PPP loan data—although not a complete story—do provide some information on small businesses in the DIB during the COVID-19 pandemic. If we assume that applying for a PPP loan is an indicator that a business needed financial support during the pandemic, the characteristics of the businesses taking advantage of these loans might point to the kinds of small businesses in the DIB that experienced the most stress. Although the PPP loan data are not definitive, interpreting the data through this lens is consistent with largely anecdotal reports of impacts to the DIB.

FIGURE 2

Total Number of Employees in Companies Receiving Large Paycheck Protection Program Loans in the Defense Industrial Base, by Industry



SOURCE: RAND analysis of U.S. government data (U.S. Department of the Treasury, 2020; and U.S. Department of the Treasury, Bureau of the Fiscal Service, 2021).

NOTE: The number of jobs reports the sum of all employees reported on PPP large loan applications across all companies within an industry, by NAICS code. Only the top ten industries with the greatest number of jobs reported on PPP large loan applications are shown.

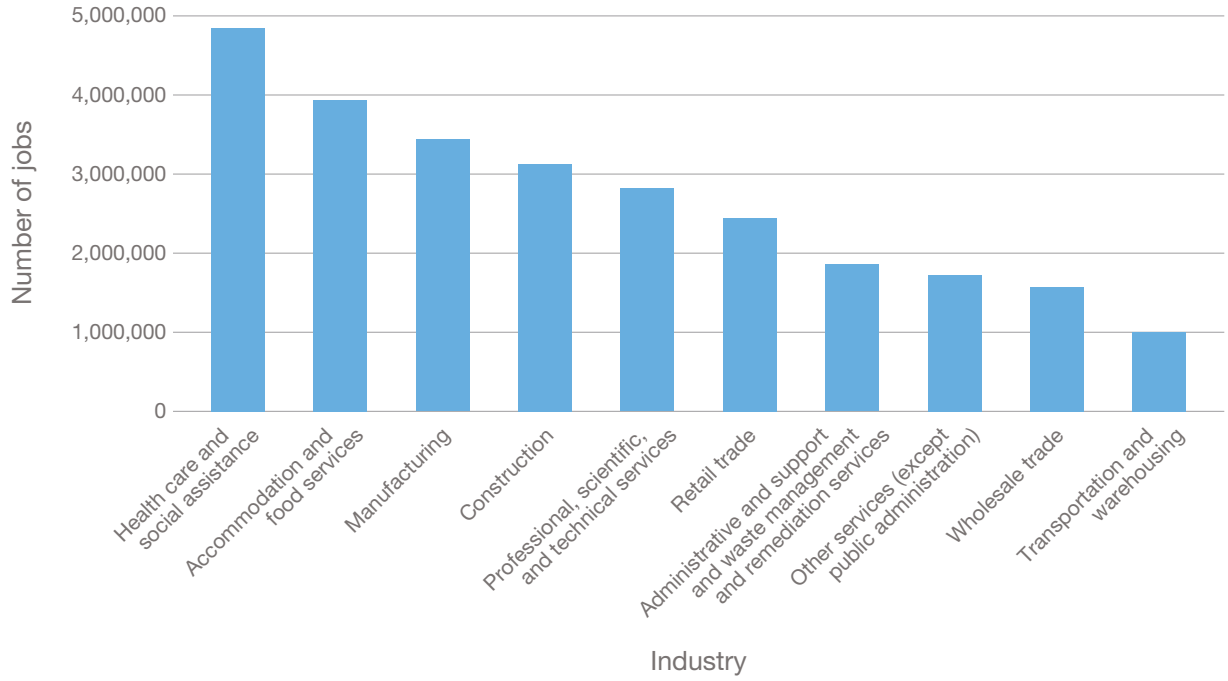
From Figure 2, we can see that manufacturing; professional, scientific, and technical services; wholesale trade; and construction are among the industries that received the greatest value of PPP loans. Some of these industries are generally less amenable to working from home—for example, a recent study found that 19 percent of construction industry jobs could be performed at home (Dingel and Neiman, 2020)—so it is conceivable that the concentration of PPP loan values provides some indicator of the financial stress that these industries faced because of pandemic-related business shutdowns.[8] Figure 5 shows that the vast majority of large PPP loans to the DIB went to companies with fewer than 100 employees, which some reports (Mehta and Insinna, 2021) have suggested were the companies in the DIB that were most at risk during the COVID-19 crisis. Finally, this initial analysis of data suggests promising future areas of research that could be explored with this data set, including detailed analysis of

- the patterns of uptake of PPP loans between DIB firms and non-DIB firms and by other firm characteristics, such as minority ownership, which could inform policy on how to target loan programs to different populations
- sector-specific uptake of PPP loans, which could inform policy on sector-specific barriers to PPP loan access.

Overall, we can see that the federal government made significant investments into small businesses in the DIB, particularly in the manufacturing sector, via the PPP. These small businesses, sometimes three or four tiers deep in supply chains, can be critical nodes in national security supply chains (Mehta and Insinna, 2021). Although it is still too early to tell what the long-term impacts of the COVID-19 crisis will be, particularly for small businesses in the DIB, it is clear from the PPP data that these investments did reach, at least in part, this critical group in the DIB.

FIGURE 3

Total Number of Employees in Companies Receiving Large Paycheck Protection Program Loans for All Organizations in the Paycheck Protection Program Loan Data Set (Defense Industrial Base and Non-Defense Industrial Base), by Industry

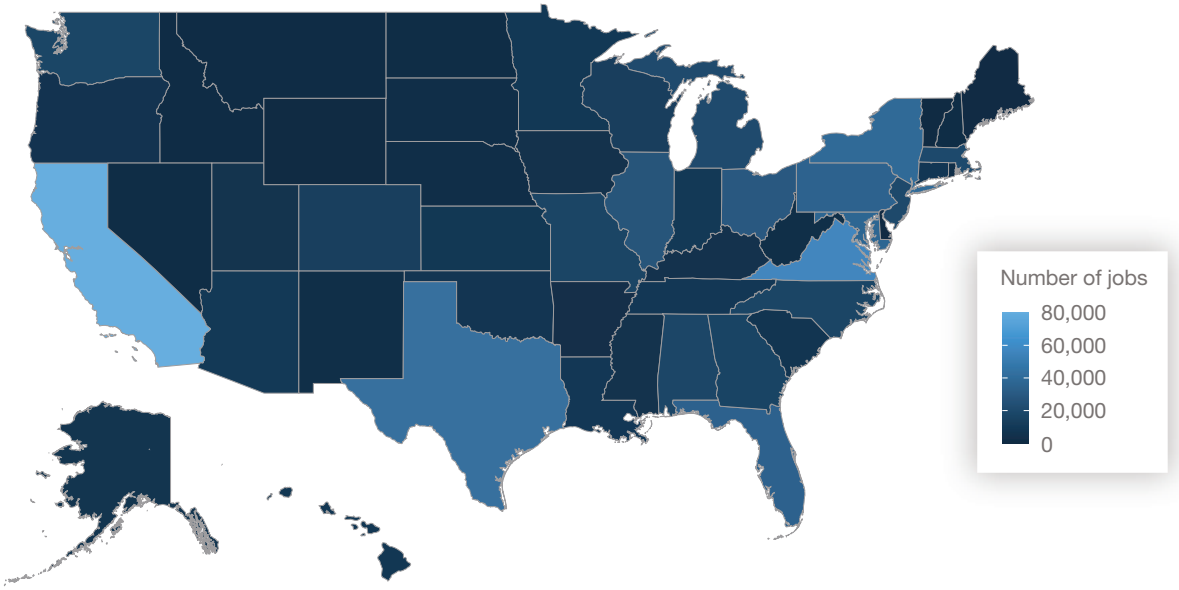


SOURCE: RAND analysis of U.S. government data (U.S. Department of the Treasury, 2020).

NOTE: The number of jobs reports the sum of all employees reported on PPP large loan applications across all companies falling into a given industry, by NAICS code. Only the top ten industries with the greatest number of jobs reported on PPP large loan applications are shown.

FIGURE 4

Total Number of Employees in Companies Receiving Large Paycheck Protection Program Loans in the Defense Industrial Base, by State

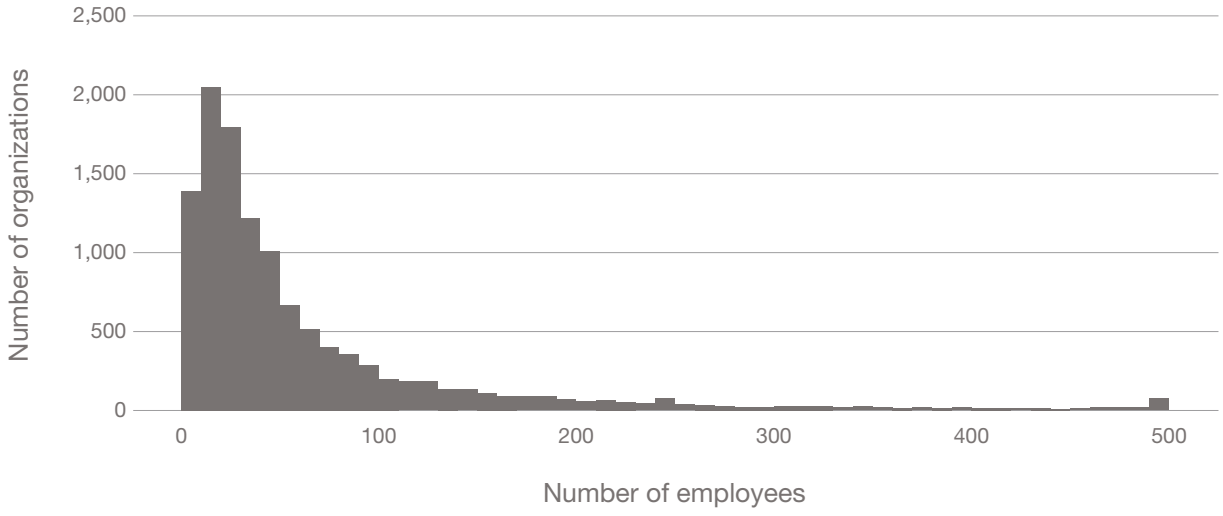


SOURCE: RAND analysis of U.S. government data (U.S. Department of the Treasury, 2020; and U.S. Department of the Treasury, Bureau of the Fiscal Service, 2021).

NOTE: The number of jobs reflects the sum of all employees reported on PPP large loan applications across all companies, by state. Values are not normalized by state population, so more-populous states generally had more employees in companies that received PPP loans.

FIGURE 5

Uptake of Paycheck Protection Program Loans in Defense Industrial Base, by Business Size



SOURCE: RAND analysis of U.S. government data (U.S. Department of the Treasury, 2020; and U.S. Department of the Treasury, Bureau of the Fiscal Service, 2021).

NOTE: The organization size is the number of employees that a company reported on its large PPP loan application. This analysis counts the number of PPP loans by organization size and includes around 900 companies that reported having zero employees.

Notes

[1] This does not include PPP investments.

[2] This includes businesses with 500 employees or fewer.

[3] This report's analysis does not consider second-round PPP loans.

[4] At the time of our original analysis, loan amounts were reported in ranges. At the time of publication, a Freedom of Information Act request led to the release of somewhat higher fidelity data. This data was not used in the analysis reported here.

[5] *Jobs protected* refers to the number of employees reported by applicants on their PPP loan application.

[6] DoD contractors receiving PPP loans were identified by determining which businesses in the PPP loan data set (United States Department of the Treasury, 2020) were also in a data set of organizations receiving DoD awards from fiscal year 2020 (United States Department of the Treasury, Bureau of the Fiscal Service, 2021). This was accomplished by searching for matches between the two data sets using business name, street address, and zip code. The algorithm used required an exact zip code match but allowed for a "fuzzy" match between business name and street address to account for variations in spelling, abbreviations, and typos. Prior to matching, punctuation, capitalization, and common abbreviations were standardized. Fuzzy matching was conducted by calculating the Jaro-Winkler distance, which is useful for comparing manually typed strings and emphasizes whether the first few characters in two strings match (Winkler, 1990). After obtaining a set of suggested matches and associated Jaro-Winkler distances, matches with large-distance values for business name or street address were removed. Manual review of edge cases was then conducted to remove additional unlikely matches. Note that only DoD contractors reporting their number of employees and industry were included in the analysis.

[7] We are unable to compare total loan size for the manufacturing industry and for the professional, scientific, and technical services industry because of the overlap in potential values. Companies are identified by their NAICS codes, as reported in loan applications, at the two-digit level. Each company is assigned to a single NAICS code in the data. Thus, the analysis cannot account for companies providing goods or services across multiple NAICS codes. This might result in undercounts of values for some industries.

[8] Of course, not being able to do in-person work because of social distancing is only one of many potential financial stressors on small businesses that could have occurred during the pandemic. Dingel and Neiman, 2020, found that 80 percent of professional, scientific, and technical service sector jobs could be performed at home, so the relatively high uptake of PPP loans in that sector cannot be entirely explained by the challenges of transitioning to remote work.

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About This Report

This report stems from a small, exploratory analysis that monitored evolving Defense Industrial Base stressors during the early phases of the coronavirus disease 2019 pandemic (through mid-2020) with the goal of identifying potential data collection opportunities to learn about supply chain resiliency. This analysis, which summarizes part of the project's efforts, uses open source data and descriptive analytics to explore Department of Defense and federal investments in the Defense Industrial Base, especially the Paycheck Protection Program.

The research reported here was completed in July 2021 and underwent security review with the sponsor and the Defense Office of Prepublication and Security Review before public release.

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