

Research Brief

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Did the Paycheck Protection Program Support Small Business Activity?

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The COVID-19 pandemic has been a widespread and prolonged disruption to life in the U.S. since a national emergency was declared on March 13, 2020. Small businesses saw substantial revenue declines in the initial months (Farrell, Wheat, and Mac 2020a, 2020b). Expenses also declined commensurately, reflecting lower revenues as well as efforts to preserve liquidity (Farrell et al. 2020). Many small businesses have adapted to current economic conditions, and while some have fully recovered, others have not. Figure 1 shows that among small businesses that were operating before the pandemic, median expenses in August 2021 were 10 percent below their January 2020 levels. However, median balances remain elevated relative to their January 2020 levels. Several relief and stimulus programs have contributed to deposit account balances during the pandemic, including the Paycheck Protection Program (PPP), Economic Injury Disaster Loan (EIDL) advances, Economic Impact Payments (EIP), and the expanded advance Child Tax Credit (CTC).¹

The signature program for small businesses was the PPP, which distributed nearly \$800 billion in 2020 and 2021 through 11.8 million loans to small businesses nationwide.² Box 1 provides additional summary details about the program. This research will help policymakers evaluate the large fiscal expenditure required to support the program and provide insight to the design considerations of future relief programs. In particular, our research offers insights about two features of the PPP: the large number of relatively small loans and the duration of what was initially short-term relief. Our findings shed light on the effects of smaller

loans, as nearly 69 percent of PPP loans in 2020 and 87 percent of those in 2021 were \$50,000 or less (Small Business Administration 2020a, 2021). Other studies have focused on loans greater than \$150,000. In addition to the PPP, state and local programs often offered smaller amounts or limited eligibility to smaller small businesses, and our research could have implications for their programs as well. For example, the New York State Pandemic Small Business Recovery Grant Program offered grants ranging from \$5,000 to \$50,000 to small businesses with 100 or fewer employees.³ Ohio's Small Business Relief Grant provided \$10,000 to small businesses with no more than 25 employees.⁴

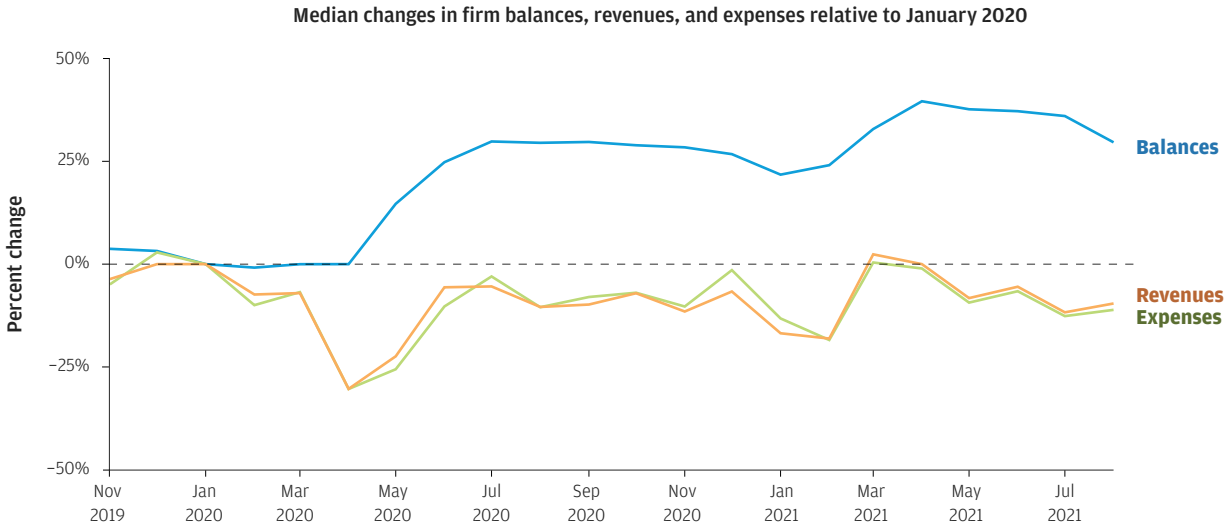
Our results inform not only the magnitude but also the duration of any PPP effects. The program was initially designed with an 8-week covered period under the expectation that firms would spend their proceeds during this time. However, as the pandemic evolved, this covered period was revised to 24 weeks, although the maximum loan amounts remained unchanged. Our analysis can provide insight into the duration of effects as well as whether the revised covered period provided the flexibility small businesses needed.

In this brief, we analyzed the magnitude and duration of any effects the PPP had on business operating activity, as measured by expenses and in comparison to a control group. While expenses materially increased among small businesses that received PPP in the week loan proceeds were received (Wheat and Mac 2021), there is less evidence about whether expenses increased more among PPP recipients than non-recipients.

Key Findings

- **Finding 1:** Upon PPP receipt, small business expenses increased by over 40 percent relative to a comparison group, with significant but declining effects over four months.
- **Finding 2:** The impact of PPP loans on expenses was largest in April and May 2020, when small business expenses were particularly depressed.
- **Finding 3:** The smallest firms experienced larger spending effects upon loan receipt, perhaps because they were more liquidity constrained than larger firms.
- **Finding 4:** Restaurants may have used PPP loan proceeds to frontload expenses.

Figure 1: Small business revenues and expenses have not rebounded to January 2020 levels, although balances are higher



Note: Sample includes small businesses operating January 2019 to February 2020.

Source: JPMorgan Chase Institute

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Based on de-identified administrative data from bank accounts, our research provides new evidence of the effect of PPP loans—particularly smaller loans—on small business activity. Other research on PPP has focused on employment outcomes, often among firms receiving loans of more than \$150,000 compared to firms ineligible for PPP. For example, there were small positive employment effects and reduced business closure among employer firms that applied for PPP loans greater than \$150,000, relative to a control group of firms with 500-1,000 employees (Hubbard and Strain 2020). Firms receiving PPP loans increased employment by 7.5 percent relative to firms ineligible for PPP (Autor et al. 2020). Employment rates at firms with fewer than 500 employees, which would have been eligible for PPP, increased by 2 percentage points compared to firms with more than 500 employees (Chetty et al. 2020).

Our research differs in several aspects: First, our sample consists largely of smaller loans to nonemployer and small employer firms. Second, our control group also consists of small businesses, so the comparison is between firms with and without observed PPP funds in the given period, not between the small businesses that were eligible and the large businesses that were ineligible for the program. Third, we focus on business expenses as the outcome variable, as a proxy for business activity, which is particularly relevant because we do not observe electronic payroll payments for most of our sample.⁵ Fourth, our period of analysis extends through the end of 2020. As the pandemic extends into its second year, policymakers may be interested in the duration of any PPP effects.

Box 1: Background on the PPP

The PPP was a complex program with guidelines that changed over time. The following provides a summary of key dates and program features. It is not an exhaustive reference of relevant legislation or rules.

Key dates

- **March 27, 2020:** PPP established by CARES Act with initial funding of \$349 billion^a
- **April 27, 2020:** PPP loan applications resumed^b after an additional \$310 billion authorized^c
- **June 5, 2020:** Paycheck Protection Program Flexibility Act^d revised full loan forgiveness terms to require at least 60 percent of proceeds to be spent on payroll during 24 weeks after loan disbursement
- **August 8, 2020:** Application period closed^e
- **December 27, 2020:** Consolidated Appropriations Act authorized \$284 billion^{f,g}
- **January 11, 2021:** First draw loans reopened, and second draw loans reopened two days later^h
- **March 4, 2021:** Nonemployers may use gross income to calculate loan amountⁱ
- **May 31, 2021:** Applications closed; banks have additional 30 days to process applications^j

Summary guidelines

- **Eligibility:** Entities with 500 or fewer employees, including self-employed individuals, sole proprietorships, and independent contractors;^k for second draw loans in 2021, no more than 300 employees and can demonstrate at least a 25 percent reduction in gross receipts between comparable quarters in 2019 and 2020^l
- **Loan forgiveness:** Initially, at least 75 percent of proceeds must be spent on payroll costs during the 8-week covered period following loan disbursement; revised June 5, 2020 to 60 percent and 24 weeks, respectively^m
- **Maximum loan amount:** 2.5x average monthly 2019 payroll costs or 2.5x net profitⁿ for nonemployers; after March 4, 2021, nonemployers may use gross income^o

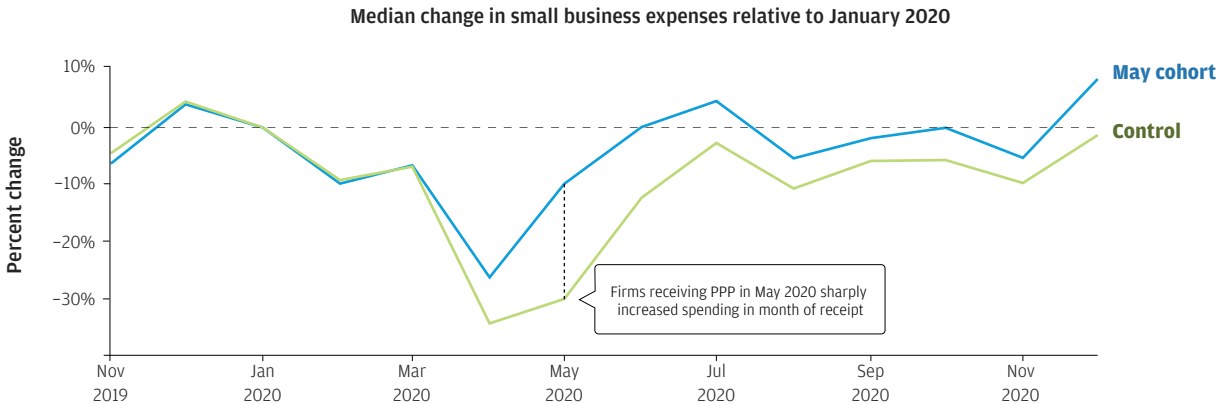
Methodology

We analyzed a de-identified sample of small businesses with Chase Business Banking accounts that received exactly one PPP loan inflow between 2020 and 2021. Within this sample, we identified a treated group consisting of firms that received PPP loans between April and August of 2020, which we divided into cohorts based on the month in which they received PPP loan proceeds.⁶ May was the largest cohort, comprising 77 percent of the 2020 loans in this analysis. We compared each monthly loan cohort to a control group of small businesses that did not receive PPP loans in 2020 but did receive them in 2021, suggesting that this group was likely eligible in 2020 as well and therefore comparable to those with loans in 2020.

We used firm expenses as a measure of activity because it may be less dependent upon customer demand or pandemic-related operating restrictions. Earlier analysis showed that

expenses were more responsive to PPP loan inflows than revenues (Wheat and Mac 2021). Figure 2 shows the median change in expenses for the May cohort and the control group, relative to their respective January 2020 values, during the months between November 2019 and December 2020. Some overall trends are evident, such as decreasing expenses in April followed by increasing expenses. While the May cohort experienced a sharp increase in expenses when PPP funds were received, the entirety of that increase cannot be attributed to PPP, as the control group's expenses also increased in May but to a lesser extent. In subsequent months, the difference between the groups narrowed. Our model was estimated over this period⁷ to include several months prior to the pandemic and several after receipt of PPP loans. This brief focuses on the estimated effects across these 14 months.

Figure 2: Firms receiving PPP increased expenses more sharply than the control group



Note: Sample includes small businesses that received PPP in May 2020 or January to June 2021 (control).

Source: JPMorgan Chase Institute

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To estimate the effects of PPP for each loan cohort relative to the control group that is also responding to the pandemic, we used a difference-in-difference event study. In this framework, we look not at the difference between the average expenses of the treated and control groups, but rather the difference in how each group's expenses changed after the event in question. That is, the first difference was the change each group experienced after PPP, some of which may have been due to the pandemic's evolution.

The difference between the treated and control groups' differences therefore provided an estimate of how receiving PPP loans changed the trend in business activity.

All of our estimates of PPP's impact on expenses used the difference-in-difference framework, which also implies that any estimates prior to the treatment—receipt of PPP loans—should be near zero despite potential level differences between the two groups. The Methodological Appendix discusses the sample and model in greater detail.

Finding One: Upon PPP receipt, small business expenses increased by over 40 percent relative to a comparison group, with significant but declining effects over four months.

Across the loan cohorts, small businesses with PPP loans increased their spending significantly for several months after loan proceeds were received, relative to the control group, although the effect diminished over time.

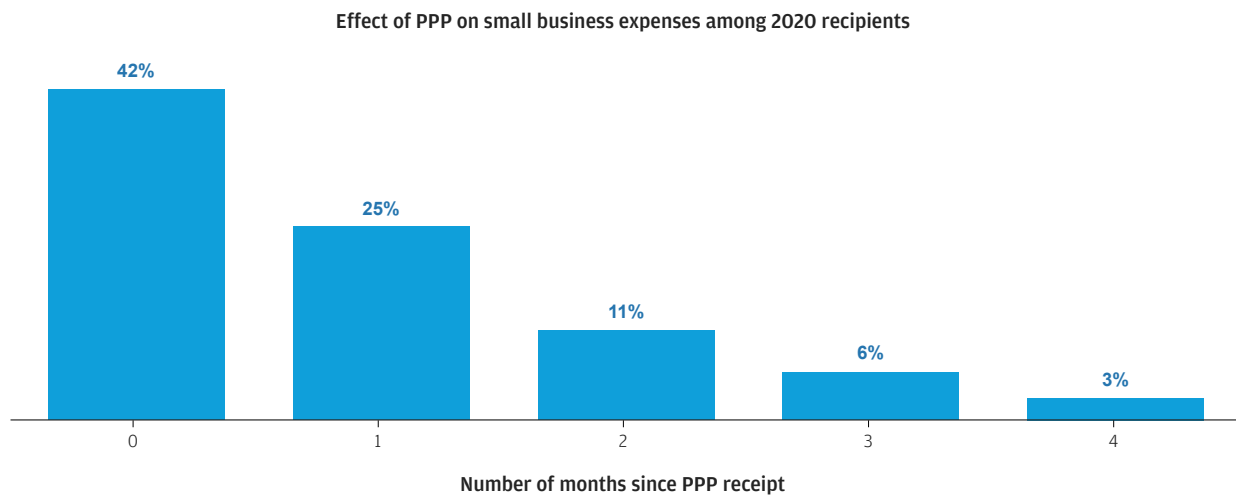
We summarized the overall effects of PPP over time by calculating the weighted average effect across cohorts for each month relative to the month of loan receipt. We weighted each cohort's estimate by its sample size, using a method proposed by Callaway and Sant'Anna (2020). As the May cohort was our largest, those estimates drive the overall shape of the effects.

Figure 3 shows that small businesses with PPP loans increased their expenses by more than those in the control group for several months after receiving the loans. During the initial month when small businesses received loan proceeds, expenses changed by over 40 percent more than

changes in the control group's expenses. Firms quickly deployed loan inflows to pay expenses, suggesting that cash liquidity was an imminent concern that was alleviated by PPP. This effect declined over time: by the fifth month, the effect was near zero. While the decline over time may not be surprising, our estimates show that the effect on firm expenses persists for approximately four months after loan receipt. Notably, this duration was less than the 24-week covered period.

The PPP was designed to offer short-term cash liquidity to small businesses, although the guidelines for using the funds were later revised from 8 to 24 weeks.⁸ Our results suggest that there was a relatively large initial effect on expenses, followed by an effort to stretch PPP funds over several months, but any effects had diminished before 24 weeks had elapsed. Firms may have timed their expenditures to occur within the guidelines, but the declining effects suggest that the 24-week guideline provided adequate flexibility.

Figure 3: Upon receipt of PPP, small business expenses increased by 42 percent relative to the control group, with declining effects over time



Note: Estimates are for 2020 PPP recipients compared to a control group.

Source: JPMorgan Chase Institute

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Finding Two: The impact of PPP loans on expenses was largest in April and May 2020, when small business expenses were particularly depressed. The PPP was established relatively quickly and emphasized the rapid disbursement of funds under the assumption that small businesses needed immediate relief. Many small businesses applied soon after applications opened, but others did not. We analyzed differences between the cohorts to understand how contemporaneous circumstances can affect the magnitude or duration of the impact on expenses. The differences between cohorts also provides insight into potential anticipatory effects, which can have implications on how future relief programs are structured.

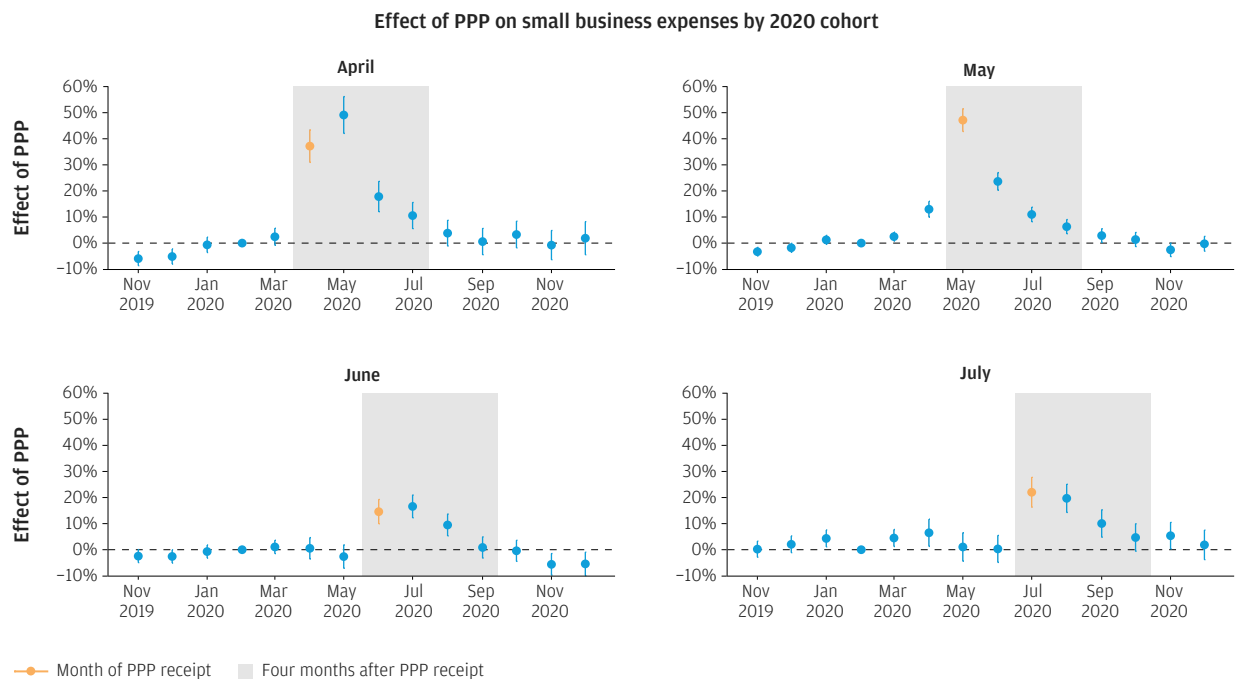
During April and May of 2020, the effect of receiving loans on expenses—relative to the control group—was larger than the effect for firms receiving loans in subsequent months. The April and May cohorts comprised 84 percent of 2020 loans in our sample, and the initial effects observed in these cohorts are relatively large. The upper panels of Figure 4 show that changes to these cohorts' expenses in May 2020 were about 50 percent higher than the changes in the expenses of the control group. In hindsight, April and May 2020 represented two months with particularly low expenses in the downturn related to the pandemic, as shown in Figure 1 and Farrell et al.

(2020). This suggests the cash infusion was particularly effective in supporting expenses during a period in which firms would have otherwise restrained their spending.

However, there may be some selection effects, as we do not know why some firms applied later. Early in the program, not all details, especially about loan forgiveness, were clear.⁹ Firms applying for loans earlier may have been more severely affected by the pandemic, while those waiting until later could have had less immediate need or other funding options. Alternatively, firms applying earlier may have been more confident that they would be able to repay a loan in the event they did not qualify for forgiveness. We do not observe these or other potential contributing factors. The Appendix provides details about the cohorts.

In contrast, the lower panels of Figure 4 show that during the month of loan receipt, changes to the June and July cohorts' expenses were 15 and 22 percent higher, respectively, than the changes to the control group's expenses. In the summer of 2020, small businesses saw some recovery as capacity constraints eased or as they found new ways to serve their customers. The effect of receiving PPP funds could have been lower in these months because they were measured relative to small businesses whose circumstances were also improving despite not receiving loans.

Figure 4: PPP loans had larger effects on small business expenses in April and May 2020



Source: JPMorgan Chase Institute

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For each cohort, we saw no statistically significant differences between the treated and control groups in the pre-treatment period. In each panel of Figure 4, the estimated differences in the months before loan receipt is near zero, with one exception, which we discuss below. This is consistent with observing parallel trends between the treated and control groups prior to receipt of the loan. That is, their expenses were exhibiting similar trends before PPP loan proceeds were received.

The May cohort exhibited increasing expenses relative to the control group in April, the month before loan receipt. This raises questions about the existence of potential anticipatory effects—effects that can have important implications for policymakers designing future programs. There are two potential channels for anticipatory effects.

First, upon the establishment of the PPP, firms that expected to be eligible for loans may have started to spend even before applying. If that were the case, then a program announcement would begin to impact behavior, implying that timely announcements are critical to the policy response. We did not find evidence consistent with this type of anticipatory effect.

A second, narrower, channel is possible in the period between loan approval and the receipt of loan proceeds. Firms may have been comfortable spending knowing their loans were approved but before the funds were posted to their accounts. Our analysis suggests the anticipatory effect seen in the May cohort was consistent with the latter, due to the timing of the reopening of the program, the loan application and approval process, and the receipt of funds.

The PPP reopened on Monday, April 27, 2020, and applications were processed and approved in the subsequent days. The loan proceeds from this set of applications were often posted to accounts in early May, but firms would have learned of their loan approvals prior to receiving the

funds and some may have begun spending based on that knowledge. To investigate this, we estimated our model specification using four-week periods instead of calendar months. For example, one four-week period was Sunday, April 26 through Saturday, May 23, 2020 so the entire period encompassed both the reopening of PPP and the funding of those applicants. There was no statistically significant anticipatory effect in the prior period, supporting the interpretation that small businesses started spending following approval, not simply because they were eligible for the program.

We also did not find anticipatory effects in subsequent cohorts who were eligible for PPP, but applied and received loans later. Similar to the May cohort, firms in other cohorts could have begun spending after receiving loan approvals and before receiving loan funds. However, in other months, loans were not clustered at the beginning of the month, so this pattern was less apparent.

The PPP required full disbursement of the loan within 10 calendar days of loan approval,¹⁰ limiting this type of anticipatory effect. This channel may be relevant for programs with longer funding timelines. For example, firms that have been approved for loans but are liquidity constrained may nevertheless need to wait until they receive the funds before they can start spending. Prior to the pandemic, the typical small business had about two weeks of cash liquidity, and long waits for funds may strain the finances of many small businesses (JPMorgan Chase Institute 2020).

The PPP provided cash liquidity to small businesses during the pandemic and emphasized rapid disbursement of funds. Our results suggest the cash infusion was particularly effective in supporting expenses during April-May 2020, when firms experienced severe disruptions to other inflows. Our results also imply that some firms changed their spending behavior before they received the funds, an effect we will discuss further in the next finding.

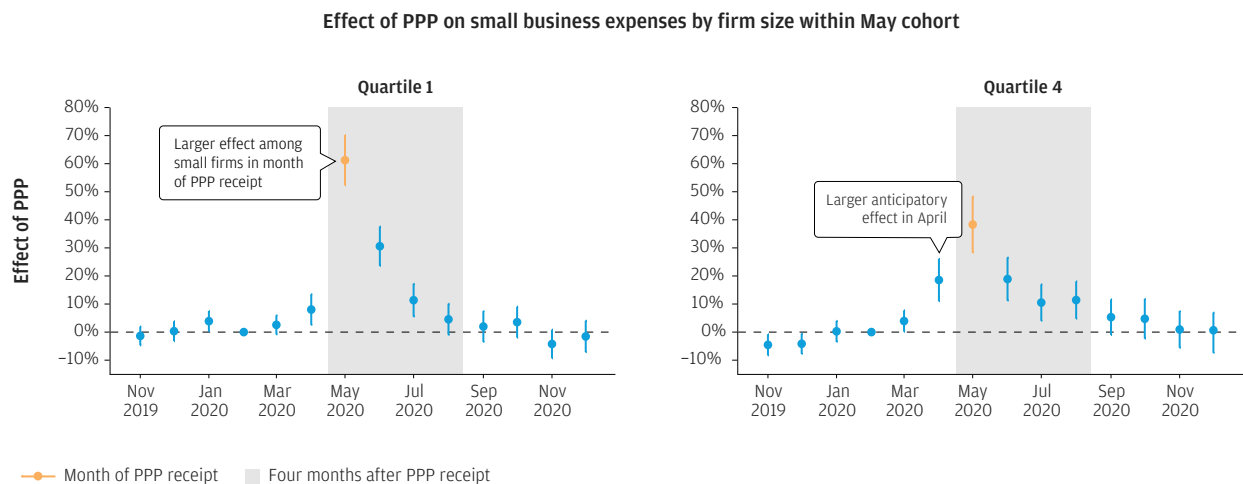
Finding Three: The smallest firms experienced larger spending effects upon loan receipt, perhaps because they were more liquidity constrained than larger firms.

Only small businesses were eligible for the PPP, but the small business sector spans a wide range of firm sizes. Among both PPP and non-PPP recipients, the vast majority of small businesses—81 percent—were nonemployers and another 17 percent were employers with fewer than 20 employees (Small Business Administration 2020b). The effects of receiving loans may vary based on firm size. For example, Hubbard and Strain (2020) found some evidence that PPP was more effective among smaller firms in their sample.¹¹ We investigated the differential effects of PPP on business expenses by firm size and found that smaller firms experienced larger effects in the month loan proceeds were received. However, smaller firms exhibited lower anticipatory effects in April, consistent with being more liquidity constrained than their larger counterparts.

We used our largest cohort to analyze differences by firm size. We separated the firms in our May sample, including both the May loan recipients and the control group, into quartiles based on their annual expenses in 2019¹² and estimated the same model. The first quartile included firms with annual expenses up to \$191,000, while the fourth quartile consisted of firms with annual expenses over \$991,000.

Figure 5 shows that smaller firms experienced larger effects on expenses in the month loan proceeds were received. For firms in the first size quartile, the increase in May expenses was 61 percent higher than the change experienced by the control group. In comparison, the effect was 38 percent for the firms in the fourth quartile. In addition, the positive effect on expenses lasted fewer months for smaller firms: three months for the first quartile compared to four months for the fourth quartile firms.

Figure 5: The smallest firms had larger effects on expenses in the month of PPP loan receipt and smaller anticipatory effects than the largest firms



Note: Firms in quartile 1 had 2019 expenses below \$191,000. Firms in quartile 4 had expenses greater than \$991,000. Treated sample includes firms that received PPP in May 2020, subsampled by 2019 expenses. Error bars indicate 95% confidence interval.

Source: JPMorgan Chase Institute

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The anticipatory effect in April was smaller for firms in the first quartile, about 8 percent, compared to the 19 percent estimated for firms in the fourth quartile in the same month. One explanation for this difference could be that the smallest firms were less able to start spending prior to receiving the loan proceeds, perhaps because they did not have the cash liquidity from other sources to draw upon. Larger small businesses could have been more willing or able to start spending prior to actually

receiving loan proceeds. This suggests that cash liquidity was more critical for the smallest small businesses.

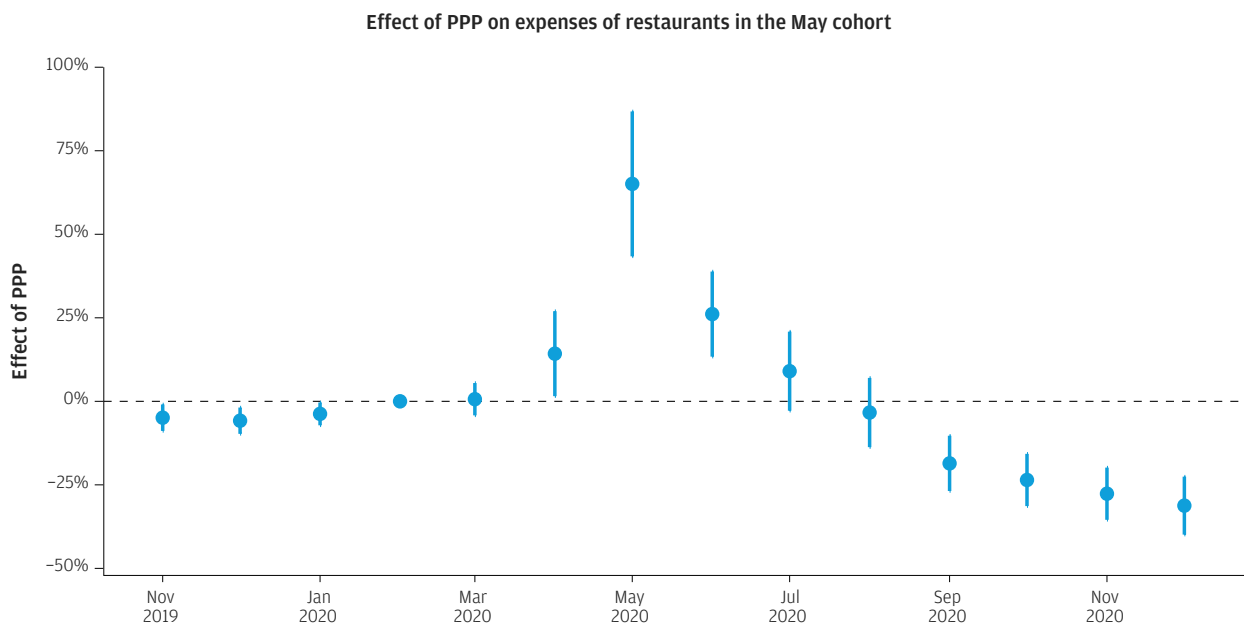
Larger effects on expenses after the receipt of loan proceeds and the smaller anticipatory effect both suggest that cash liquidity may be more critical to the spending decisions of smaller small businesses. The PPP required loan disbursements within 10 calendar days of approval, limiting this type of anticipatory effect. However, it could be a consideration in the design of future programs.

Finding Four: Restaurants may have used PPP loan proceeds to frontload expenses. Restaurants have been particularly hard hit during the pandemic. While many restaurant owners adapted their business models to changing economic conditions related to the COVID-19 pandemic, these changes may not have been sufficient to compensate for evolving consumer demand. Their recovery has lagged behind small businesses in other industries.¹³ The challenges faced by small restaurants provided an opportunity to better understand how short-term relief may have been used by firms facing longer term disruption more

broadly. We used the May cohort, which offers the largest sample size, and restricted it to restaurants in this model.

Similar to what we saw across our sample, small restaurants also increased their expenses relative to the control group during the initial months after receiving their loans, as shown in Figure 6. However, the significant positive effect did not last long—just two months after receiving the loan proceeds—although there was an anticipatory effect in April. However, beginning in September 2020, the change in expenses for restaurants with PPP loans was significantly lower than the control group.

Figure 6: Restaurants initially increased expenses upon PPP loan receipt, but changes to spending later in 2020 were lower than the control group



Note: Sample includes restaurants that received PPP in May 2020 compared to restaurants in the control group. Error bars indicate 95% confidence interval.

Source: JPMorgan Chase Institute

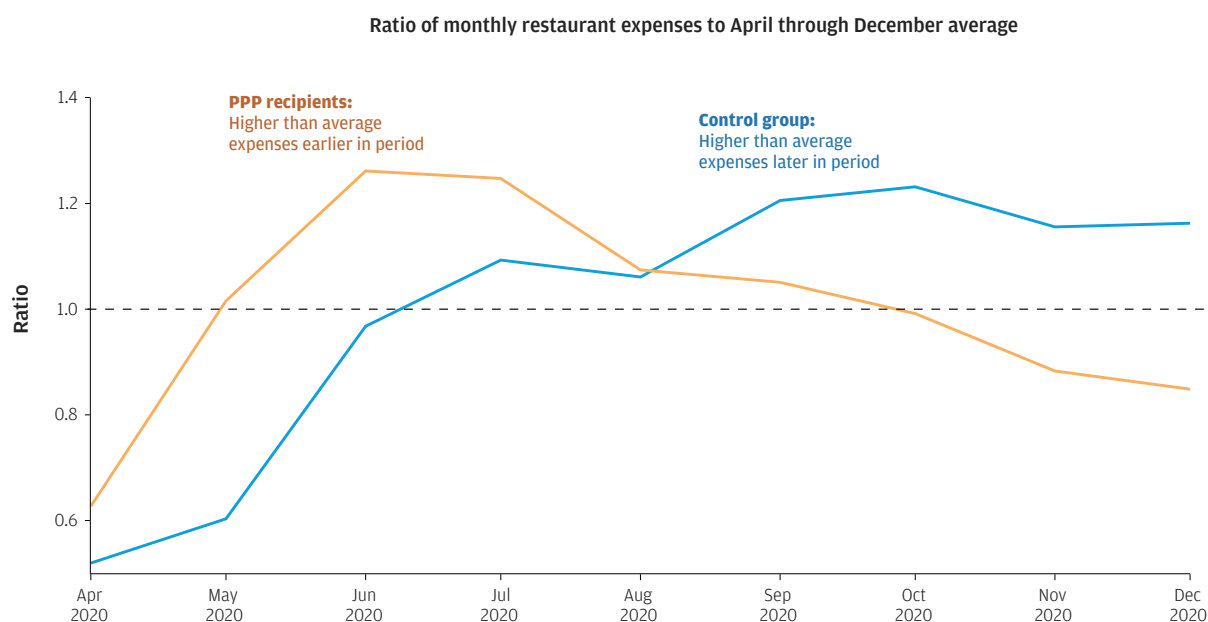
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Our difference-in-difference framework does not estimate differences in expense levels between groups but rather differences in how each group changes. Over the entire period, restaurants with PPP had higher average expenses than the control group. However, our results suggest they frontloaded those expenses in the initial months after receiving their loan proceeds.

Figure 7 shows the ratio of average monthly expenses to the average over the April to December 2020 period for each group. If monthly expenses were perfectly smooth over time, then this ratio would equal 1 in each month. That is, each month's average expense is the same as in other months. For restaurants with PPP loans in May, monthly

expenses were higher early in the period and shortly after receiving loan proceeds. Later in 2020, expenses were lower than their period average. Among restaurants in the control group, we saw a different pattern. Average expenses in May were lower than their period average and more gradually increased. In autumn of 2020, average expenses for the control group were increasing when those of the treated group were decreasing, resulting in the negative difference-in-difference estimates. This suggests that restaurants receiving PPP funds in May were able to frontload more expenses in the initial weeks, perhaps investing in outdoor seating or an online presence. In contrast, firms without PPP loans could have delayed or spread out similar expenses.

Figure 7: Restaurants with PPP spent more soon after receiving funds, while the control group ramped up spending later in 2020



Note: Sample includes restaurants that received PPP in May 2020 and restaurants in the control group.

Source: JPMorgan Chase Institute

[View text version](#)

Small businesses in other industries may have also used their PPP loan proceeds to frontload expenses. However, that pattern may be obscured in industries that have experienced more robust recoveries, such as health care and professional services. It is perhaps not a coincidence that we observe this pattern in restaurants and, to a lesser extent, personal services, two of the hardest hit industries during the pandemic.

Our model estimates illustrate that the experiences of small businesses during the pandemic—including experiences with relief programs such as PPP—varied by industry. Their experiences suggest the need for industry-specific considerations alongside broader policy interventions.

Conclusions and Implications

The PPP was an unprecedented program designed to support small businesses through the pandemic. This brief provides insight into the magnitude and duration of the effect of PPP loans on small business expenses. With this context in mind, we offer the following implications for leaders and decision makers seeking to support small businesses during periods of severe economic disruptions:

Small businesses need flexibility in how and when to use relief funds. Policymakers want to ensure that relief funds are used promptly and effectively. However, the wide range of small businesses implies that they may face a wide range of challenges resulting from the same disruption. Policymakers did recognize this during the pandemic and revised some PPP rules, such as increasing the time for using the loan proceeds from 8 to 24 weeks and decreasing the share of funds to be used on payroll expenses from 75 to 60 percent. As the pandemic evolved, some sectors may have needed different strategies for how and when to use their loan proceeds. More generally, relief programs should consider the need for flexibility along with the need for structure and guidelines.

Timeliness is an important factor in effective relief. Our research demonstrates that PPP's largest impact on business expenses was in April and May 2020, when business spending was particularly depressed. The CARES Act was passed relatively quickly, establishing several different relief

programs, including the PPP. The timeliness of this action may have been critical given the sudden disruption caused by the pandemic. Prior to the pandemic, typical small businesses had about two weeks of cash liquidity, with Black- and Latinx-owned businesses having lower cash buffers than White-owned ones (JPMorgan Chase Institute 2020; Farrell, Wheat, and Mac 2020c). Nevertheless, in designing relief programs, policymakers must balance the need to disburse relief funds quickly with competing goals, such as considering those who have been most severely affected, collecting data and documentation from applicants, or mitigating the risk of fraud.

Targeted policies could be appropriate, depending on the circumstances. A widespread emergency such as the pandemic required a relief program that was just as broad. However, the related economic disruption was not experienced evenly across the small business sector, as restaurants and personal services have been more severely affected than other industries. During the pandemic, the Restaurant Revitalization Fund¹⁴ and Shuttered Venue Operator Grants¹⁵ offered additional assistance, but they were not available until 2021. Depending on the circumstances of the economic disruption, policymakers should consider a possible role for more targeted interventions. Examples include industry-specific programs, perhaps as complements to broader programs, or using maximum loan amounts to focus relief efforts.

Methodological Appendix

Sample

To analyze the effects of PPP on small business expenses, we created a sample of de-identified small businesses that were similar but for their observed receipt of PPP loans. Firms included in our sample, either in a treated or control group, have Chase Business Banking accounts and exactly one observed PPP loan. The PPP lender could be Chase, as it was in 78 percent of our sample, or another lender.¹⁶ To reduce confounding factors, we excluded any firms that received either more than one PPP loan or an EIDL advance. It is possible that firms in our sample had access to other sources of funding during the period of analysis.

Our estimates used expense data derived from the de-identified deposit account transactions from November 2019 through December 2020. To ensure that we were not measuring expenses during firms' startup phases, we required that the accounts were open for at least a year prior to November 2019 with activity during each month of the pre-pandemic period. Accounts also must have stayed open through the end of December 2020, but accounts did not need to have activity in every month of 2020.¹⁷ Satisfying the criteria for inclusion in our sample necessarily means that we neither included every PPP loan originated by Chase nor did we include only those originated by Chase.¹⁸ A careful reader of our reports will notice that the typical firm in this sample was somewhat larger than those in our other reports.

Using this sample, we separated the 2020 PPP loan recipients into cohorts based on the month the loan proceeds were posted into the deposit accounts. Each cohort represents a treated group. The control group was the same for each treated group: firms with their first and only PPP loan in 2021. Therefore, they were not-yet-treated during the estimation period which ends in 2020. However, the fact they received a PPP loan in 2021 implies they likely would have qualified in 2020. Firms that did not apply by August 2020 would not have

known of future opportunities to apply until legislation reauthorizing the PPP was signed in late December 2020.

There may have been differences between firms receiving PPP loans earlier, compared to those receiving loans later. However, for our research design, differences between treated and control groups are acceptable as long as they followed parallel trends prior to the treatment. Firms applying earlier could have had greater need; firms applying later could have been waiting for clearer guidelines. Table A1 shows the median loan sizes across cohorts. The typical loan amount in our May cohort was \$27,000, compared to \$11,000 in the July cohort. The median loan amount among the 2021 loans in our sample was \$17,000. The publicly available data from the SBA show similar trends. Loans approved in May 2020 had a median size of \$19,000, while the median among those approved in July was \$13,000. Limited to the loans under \$150,000, which is more comparable to our sample, a similar pattern of larger loans earlier emerges. However, some nonemployer firms would have qualified for larger loans in 2021 than in 2020. A rule change allowed them to calculate their maximum loan amount based on gross income instead of net income.¹⁹

We did not include firms that never received a PPP loan in the control group because while some of these firms may have served as appropriate controls, others may have been ineligible for the PPP. Survey data indicated that nonemployer firms were less likely to apply for PPP than employers, with the most common reason cited as the expectation that they would not qualify either for the loan or for loan forgiveness (Federal Reserve 2021a, 2021b). Other reasons included confusion about the program, not needing funding, or seeking other funding. The Federal Reserve also noted that 30 percent of nonemployers collected unemployment insurance benefits (2021b),²⁰ which could have been an alternate avenue for relief.

Table A1: Median loan amounts and share of loans, by sample and cohort

2020 PPP loans	JPMCI sample			SBA data			
	Median loan amount	Firms		Median loan amount		Share of loans	
		Count	Share	\$150k and under	All loans	\$150k and under	All loans
April	\$59,000	3,508	7%	\$27,000	\$38,000	52%	56%
May	\$27,000	36,303	77%	\$18,000	\$19,000	32%	29%
June	\$14,000	4,106	9%	\$13,000	\$13,000	9%	8%
July	\$11,000	2,641	6%	\$13,000	\$13,000	5%	4%
August	\$11,000	728	2%	\$13,000	\$14,000	2%	2%
Total		47,286	100%			100%	100%
2021 PPP loans	\$17,000	6,657		\$19,000	\$20,000		

JPMCI sample includes firms with one PPP loan from Chase or another lender and meet our criteria for deposit account activity. Loan cohorts are based on the date loan proceeds were posted to deposit accounts. Firms with loans approved in the last week of April 2020 received their funds in early May.

SBA tabulation is based on available data as of June 30, 2021. Loan cohorts are based on loan approval date.

Table A2 shows that the industry distribution in our sample was similar to the distribution across those industries for all loans reported by the SBA. However, our sample was more heavily weighted in industries common in greater metropolitan areas. For example, our sample included a

larger share of firms in health care and professional services. Our sample did not include industries for which we did not have a representative sample, including transportation and warehousing, as well as agriculture, forestry, fishing, and hunting.

Table A2: Industry composition, by sample and cohort

	JPMCI sample					SBA data			
	2020 loans					2021 loans	Overall	\$150k and under	All loans
	April	May	June	July	August				
Other professional services	20%	17%	13%	14%	14%	17%	17%	14%	14%
Health care services	16%	16%	15%	16%	14%	12%	15%	11%	11%
Retail	11%	13%	12%	12%	13%	12%	13%	13%	13%
Construction	12%	13%	14%	14%	15%	16%	13%	14%	14%
Restaurants	9%	10%	10%	8%	9%	10%	10%	9%	10%
Repair & maintenance	7%	8%	8%	9%	8%	9%	8%	9%	9%
Personal services	5%	7%	13%	13%	12%	11%	8%	16%	15%
Wholesalers	7%	7%	5%	5%	5%	5%	6%	5%	5%
Real estate	5%	5%	5%	5%	5%	3%	5%	7%	6%
High-tech services	5%	4%	3%	2%	3%	3%	3%	2%	2%
Metal & machinery	2%	1%	1%	1%	<1%	1%	1%	1%	2%
High-tech manufacturing	<1%	<1%	<1%	<1%	<1%	<1%	<1%	0%	0%
	100%	100%	100%	100%	100%	100%	100%	100%	100%
Selected industries as share of total								62%	62%

JPMCI sample includes firms with one PPP loan from Chase or another lender and meet our criteria for deposit account activity.

SBA tabulation is based on available data as of June 30, 2021.

Model

We used a difference-in-difference event study to estimate the effect of receiving PPP loans on expenses over time. We were particularly interested in how long any effects might persist, as the pandemic has lasted longer than expected. An advantage of the difference-in-difference framework is that level differences between the treated and control groups are acceptable as long as the two groups are following parallel trends prior to the event of interest.

Using our May cohort and control group as an example, the average log expenses of May cohort was larger than that of the control group, but the difference between them was stable. After May 2020, small business expenses could have been recovering for both the treated group of firms with PPP loans as well as for the control group, but it is the difference in how each group's expenses changes—the difference in the differences—after May that is of interest.

$$\ln(\text{expenses})_{f,m} = \alpha + \delta(\text{PPP}_f) + \sum_{m=201911}^{202012} \gamma_m(\text{PPP}_f * \text{Month}_m) + \varphi_i + \varphi_s + \varphi_m + \varepsilon_{f,m}$$

The equation above shows the regression model estimated. We chose expenses as a proxy for business activity for two reasons. First, unlike revenues, it is possible for expenses to be independent of consumer demand or pandemic-related restrictions. Consider a business that was not permitted to operate or perhaps chose not to operate during the pandemic and therefore generated no revenue. Another possibility is if the business did continue to operate, but customer demand was limited due to the pandemic. However, the firm could have—using PPP loan proceeds or other funds—continued to pay its employees, utilities, and other expenses. To the extent that PPP facilitated this continuity despite a disruption in revenues, we would want to consider its expense activity. Moreover, expenses are often highly correlated with revenues (Farrell et al. 2020), making it an appropriate proxy for business activity. Expenses, which include payroll expenses, are defined as outflows that are not related to financing. Financing could include transfers to personal accounts or loan repayment.²¹ We observed electronic payroll payments in 37 percent of firms in our sample.

The model for each loan cohort in 2020 was estimated separately with the same control group of firms with 2021 PPP loans.²² For example, the May cohort included firms with May 2020 PPP loans in the treated group and firms with 2021 PPP loans in the control group.²³ Groups were weighted so that the treated and control groups each represented half of the sample. Our model was estimated at the firm-month level using the above equation, where f indexed the firm and m indexed the month. The variable PPP_f is a dummy variable equal to one if the firm was in the PPP month cohort, and Month_m is a dummy variable for the month.²⁴ Also included are controls for industry, state, and month.

Data Explanation

Figure 1: Median changes in firm balances, revenues, and expenses relative to January 2020

Line chart showing median changes in small business balances, revenues, and expenses relative to January 2020 in each calendar month from November 2019 through August 2021. The balance line shows that median balances increased in April 2020 and stayed at elevated levels through August 2021, relative to January 2020. The revenues and expenses lines show that median revenues and expenses fell to -30 percent of January 2020 levels in April 2020 and remained below January 2020 levels in most months through August 2021.

[View chart version](#)

Figure 2: Median change in small business expenses relative to January 2020

Line chart showing the median change in expense relative to January 2020 for the May 2020 PPP recipient cohort and control group from November 2019 through December 2020. The chart shows that expenses for each group were similar until April 2020, when the control group had a larger drop in expenses, relative to January 2020, than the May 2020 PPP recipient cohort. The gap in expenses between the two groups is greatest in May 2020, when the PPP recipients increased spending more sharply than the control group.

[View chart version](#)

Figure 3: Effect of PPP loans on small business expenses among 2020 recipients

Bar chart showing the estimated effect of PPP on small business expenses compared to the control group. Chart shows the estimates as the number of months since PPP receipt on the x-axis, and ranges from 0 to 4 months. In the month of PPP receipt, expenses increased by 42 percent relative to the control group, followed by 25 percent, 11 percent, 6 percent, and 3 percent in the subsequent four months.

[View chart version](#)

Figure 4: PPP had larger effects on small business expenses in April and May 2020

Four scatter plot charts with error bars at the 95 percent confidence interval showing the effect of PPP on small business expenses for each monthly cohort: April 2020, May 2020, June 2020, and July 2020. Estimated effect shown for every calendar month between November 2019 and December 2020. Chart shows almost no difference between each cohort and the control group prior to PPP receipt for the April, June, and July cohorts. The May cohort shows expenses increased by 13 percent more than the control group in April 2020 compared to the control group. Expenses for the April cohort increased by 37 percent relative to the control group in April 2020, expenses for the May cohort increased by 47 percent more than the control group in May 2020, expenses for the June cohort increased by 14 percent more than the control group in June 2020, and expenses for the July cohort increased by 22 percent more than the control group in July 2020. Charts show that in all cohorts the effect of PPP on small business expenses diminishes to zero within four months of PPP receipt and then no difference with the control group through the end of the year.

[View chart version](#)

Figure 5: Effect of PPP on small business expenses by firm size within May cohort

Scatter plot charts with error bars at 95 percent confidence interval showing the effect of PPP on small businesses in the May cohort sized by 2019 expenses. Estimated effect shown for every calendar month between November 2019 and December 2020 for the first and fourth quartiles of firm expenses. Among small businesses in both quartiles there is almost no difference in expenses until April 2020. Small businesses in quartile 1 have changes to expenses that are 8 percent higher than the control group in April 2020, and small businesses in quartile 4 have changes that are 19 percent higher than the control group in April 2020. Expenses for small businesses that received PPP in the first quartile of 2019 expenses increased by 61 percent more in May 2020 than the control group, expenses for small businesses that received PPP in the fourth quartile of 2019 expenses changed by 38 percent more in May 2020 than the control group. The differences in effects between small businesses in both quartiles 1 and 4 and the control group diminish over the next four months, and there are no differences in effects at the end of 2020.

[View chart version](#)

Figure 6: Effect of PPP on expenses of restaurants in the May cohort

Scatter plot chart with error bars at 95 percent confidence interval showing the effect of PPP on restaurants in the May cohort. Estimated effect shown for every calendar month between November 2019 and December 2020. Almost no difference in expenses between May PPP recipient restaurants and the control group prior to PPP receipt. Expenses for restaurants that received PPP in May 2020 increased by 61 percent more than expenses for the control group in May 2020. Changes to expenses for restaurants that received PPP in May 2020 were lower than those for the control group from September 2020 through December 2020.

[View chart version](#)

Figure 7: Ratio of monthly restaurant expenses to April through December average

Line chart showing monthly expenses from April 2020 through December 2020 as a ratio of the average monthly expenses over the entire period, separated by restaurants that received PPP in May 2020 compared to the control group. Restaurants that received PPP in May 2020 had higher-than-average expenses from May 2020 through September 2020. The control group had higher-than-average expenses from July 2020 through the end of the year.

[View chart version](#)

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Box 1: Endnotes

- a CARES Act. <https://www.congress.gov/116/plaws/publ136/PLAW-116publ136.pdf>.
- b Small Business Administration Press Release Number 20-34, April 24, 2020. <https://www.sba.gov/article/2020/apr/24/joint-statement-sba-administrator-jovita-carranza-treasury-secretary-steven-t-mnuchin-resumption>.
- c Paycheck Protection Program and Health Care Enhancement Act. <https://www.congress.gov/116/plaws/publ139/PLAW-116publ139.pdf>.
- d Paycheck Protection Program Flexibility Act of 2020. <https://www.congress.gov/116/plaws/publ142/PLAW-116publ142.pdf>.
- e PPP Extension Act of 2020. <https://www.govinfo.gov/content/pkg/PLAW-116publ147/pdf/PLAW-116publ147.pdf>.
- f <https://home.treasury.gov/policy-issues/coronavirus/about-the-cares-act>.
- g <https://www.congress.gov/116/bills/hr133/BILLS-116hr133enr.pdf>.
- h Department of the Treasury Press Release, January 8, 2021. <https://home.treasury.gov/news/press-releases/sm1230>.
- i “Business Loan Program Temporary Changes; Paycheck Protection Program-Revisions to Loan Amount Calculation and Eligibility.” Small Business Administration. March 8, 2021. <https://www.federalregister.gov/documents/2021/03/08/2021-04795/business-loan-program-temporary-changes-paycheck-protection-program-revisions-to-loan-amount>.
- j PPP Extension Act of 2021. <https://www.whitehouse.gov/briefing-room/legislation/2021/03/30/press-release-bill-signing-h-r-1799/>.
- k PPP Information Sheet. <https://home.treasury.gov/system/files/136/PPP--Fact-Sheet.pdf>.
- l “Paycheck Protection Program Second Draw Loans: Top-Line Overview.” Department of the Treasury. <https://home.treasury.gov/system/files/136/Top-line-Overview-of-Second-Draw-PPP.pdf>.
- m Department of the Treasury Press Release, June 8, 2020. <https://home.treasury.gov/news/press-releases/sm1026>.
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- o Effective March 4, 2021. “Business Loan Program Temporary Changes; Paycheck Protection Program-Revisions to Loan Amount Calculation and Eligibility.” Small Business Administration. March 8, 2021. <https://www.federalregister.gov/documents/2021/03/08/2021-04795/business-loan-program-temporary-changes-paycheck-protection-program-revisions-to-loan-amount>.

Endnotes

- 1 EIP and CTC were made to eligible individuals as opposed to firms. However, the majority of small businesses at large and in our sample are nonemployer firms. Pass-through entities, such as sole proprietorships, report net income on their owners' tax returns. If those tax returns used the business's direct deposit information, the payments could have been deposited into the business checking accounts.
- 2 Based on approvals through May 31, 2021 (Small Business Administration 2021).
- 3 New York Small Business Pandemic Recovery Initiative Fact Sheet (New York State Senate, updated August 1, 2021). <https://www.nysenate.gov/newsroom/articles/2021/brad-hoylman/new-york-small-business-pandemic-recovery-initiative-fact-sheet>.
- 4 Small Business Relief Grant Fact Sheet (Ohio Development Services Agency). <https://businesshelp.ohio.gov/pdf/10292020-Small-business-relief-grant.pdf>.
- 5 We observed electronic payroll payments for 37 percent of firms in our sample. However, not all firms with employees use electronic payroll processors, and there may have been employer firms for whom we did not observe payroll payments. For example, they may have processed payroll independently using paper checks, as opposed to using an electronic payroll processor.
- 6 We used the dates on which transactions were posted to accounts. Parties may be aware of pending transactions prior to the post date.
- 7 The omitted period is February 2020.
- 8 Revised June 5, 2020 by the Paycheck Protection Program Flexibility Act of 2020. <https://www.congress.gov/116/plaws/publ142/PLAW-116publ142.pdf>
- 9 The interim final rule with details on loan forgiveness was published June 1, 2020. <https://home.treasury.gov/system/files/136/PPP-IFR-Loan-Forgiveness.pdf>.
- 10 Federal Register, Vol. 85, No. 86. May 4, 2020. <https://home.treasury.gov/system/files/136/Interim-Final-Rule-on-Disbursements.pdf>.
- 11 Their sample consisted of firms applying for PPP loans greater than \$150,000 (Hubbard and Strain 2020).
- 12 Firm size can be measured in different ways. Commonly used measures include the number of full-time employees or annual revenues. Since our model specification is based on expenses, and revenues and expenses are highly correlated, we used expenses to categorize firm size.
- 13 Median small restaurant expenses were 18 percent lower in September 2020 compared to the prior year; among all small businesses, expenses were 7 percent lower (Farrell et al. 2020). The Opportunity Insights Economic Tracker reported that small business revenue in the leisure and hospitality industry was 59 percent lower at the end of June 2021 than in January 2020. In comparison, revenues among all small businesses was 43 percent lower than January values.
- 14 The \$28.6 billion Restaurant Revitalization Fund was established by the American Rescue Plan. Applications opened May 3, 2021 (Small Business Administration Release Number 21-33). <https://www.sba.gov/article/2021/apr/27/sba-administrator-guzman-announces-application-opening-286-billion-restaurant-revitalization-fund>.
- 15 The \$16.2 billion Shuttered Venue Operators Grants program opened April 8, 2021 (Small Business Administration Release Number 21-28). <https://www.sba.gov/article/2021/apr/07/sba-open-shuttered-venue-operators-grants-applications-april-8-12-pm-edt>.
- 16 We identified PPP loan inflows from other lenders based on transaction characteristics.
- 17 The resulting sample reflects surviving firms in that their deposit accounts remained open through the end of 2020. However, firms without transaction activity in their open accounts were included in the sample. This requirement was consistently applied across treated and control groups. The control group, consisting of firms with 2021 PPP loans, necessarily kept their accounts open through 2020, as they deposited their loan proceeds in 2021.
- 18 For example, Chase PPP loans deposited into accounts other than Business Banking accounts would not be included. Also excluded are firms with accounts that do not meet our activity criteria and firms that received PPP loans in both 2020 and 2021.
- 19 Small Business Administration. March 8, 2021. "Business Loan Program Temporary Changes; Paycheck Protection Program-Revisions to Loan Amount Calculation and Eligibility." <https://www.federalregister.gov/documents/2021/03/08/2021-04795/business-loan-program-temporary-changes-paycheck-protection-program-revisions-to-loan-amount>.
- 20 Self-employed workers are usually not eligible for unemployment benefits, but the CARES Act gave states the option to extend benefits to them.
- 21 Deposit account transactions are classified based on various transaction characteristics. Transactions

are aggregated to the month based on the date the transaction posted to the account.

- 22 Including all cohorts in one model with staggered treatment may lead to unexpected weighting across cohorts (Goodman-Bacon 2021).

- 23 Within a month cohort, the loans may have been received at different times of the month, but this is not modeled at our level of aggregation. For our May cohort, which is the largest in our sample, most loan proceeds were deposited in

early May 2020 after PPP applications resumed on April 27, 2020.

- 24 February 2020 is the omitted month.

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