

The Local Financial Impact of the
Paycheck Protection Program:
County Level Determinants

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INTRODUCTION

“Biggest fraud in a generation” (Dilanian & Strickler, 2022).

Such a statement is not what one wants to hear about a \$789 billion relief program. It is, however, the leading media narrative around the Paycheck Protection Program (PPP).

In March 2020, the COVID-19 pandemic and resulting economic fallout following social distancing and the government lockdown mandates caused significant hardship for millions of small businesses without access to public financial markets or other ways to manage short-term costs. In anticipation of the adverse economic impact of COVID-19, Congress swiftly enacted the Paycheck Protection Program (PPP), a part of the Coronavirus Aid, Relief and Economic Security (CARES) Act, to provide small businesses with the funds needed to maintain their payroll, hire back employees, and cover applicable overhead. A main feature of the program was the eligibility for recipient firms to receive loan forgiveness if they used at least 75% (later changed to 60% in the Paycheck Protection Program Flexibility Act) of the funds to maintain their pre-crisis level of full-time equivalent employees. To distribute funds quickly, the U.S. Treasury designated certain financial institutions to distribute the loans, which raised key targeting concerns as banks prioritized businesses with whom they had strong relationships (Granja et al., 2020). Moreover, some small businesses were unable to even apply for loans in the initial round because PPP requirements were stringent, poorly communicated, confusing, and constantly changing. Nevertheless, the program provided loans worth \$789 billion to small American businesses over the two-year span, including the aid given under the Economic Aid to Hard-Hit Small Businesses, Nonprofits, and Venues Act (Economic Aid Act), which further targeted PPP loans to the smallest businesses left behind in previous relief efforts.

Although scholars have done considerable work to study the program’s impact on employment outcomes, the success of PPP remains debatable. This thesis examines the local financial impact of PPP loans, disbursed in both 2020 and 2021, and addresses three main questions: First, did the Paycheck Protection Program result in lower unemployment rates in participating counties? Second, did the Paycheck Protection Program stimulate consumer spending in participating counties? Third, was aid given in 2021 through the Economic Aid Act more effective than the initial 2020 Paycheck Protection Program? The remainder of the thesis addresses these above questions.

BACKGROUND

The Pandemic Recession and Potential Policy Responses

Following the declaration on March 13, 2020, that the COVID-19 outbreak in the United States constituted a national emergency, responses in the form of lockdowns, travel restrictions, and work facility closures led to vast social and economic disruption.¹ In the week ending March 14, 2020, Americans filed 282,000 initial claims for unemployment insurance benefits, which quickly increased to 6.9 million initial claims in the week ending March 28, shattering the previous record of 695,000 new claims set in October 1982. Similarly, the unemployment rate stood at 14.7% in April, the highest rate since the Great Depression, compared to 3.5% in February 2020. Real GDP also contracted at a 31.4% annual rate in the second quarter of 2020, signaling that the pandemic's adverse economic effects extended beyond the labor market into the consumer market (Hubbard & Strain, 2020).

The COVID-19 public health crisis and its resulting economic crisis put unprecedented strain on small businesses in communities across the country. Small businesses account for 44% of the U.S. GDP, create two-thirds of net new jobs, and employ nearly half of America's workers (U.S. Small Business Administration, 2021). Following the declaration of a state of emergency, many small businesses experienced large declines in demand due to social distancing and the government lockdown mandates (Cole, 2020). Unlike large businesses, with diversified revenue streams and access to capital markets, small and midsize businesses could not readily access capital markets to shore up their balance sheets. Additionally, only half of small businesses hold cash reserves sufficient to cover fifteen days, and only four in ten have a three-week cash buffer (Farrell et al., 2019). With such limited cash holdings among these small businesses, many scholars believed that the best way to support them during the crisis was to provide them with immediate access to capital in order to replace their lost revenues until normal operations could resume (Lettieri & Lyons, 2020).

Paycheck Protection Program

The Paycheck Protection Program (PPP), run by the U.S. Small Business Administration (SBA) and the Treasury Department, was signed into law on March 27, 2020 as part of the Coronavirus Aid, Relief, and Economic Security (CARES) Act. The \$2.2 trillion stimulus bill began issuing loans seven days later, on April 3 (Hubbard & Strain, 2020). The program disbursed forgivable loans—essentially grants—to support small businesses, defined by the SBA as firms

¹ Table A in the Appendix summarizes, at a high level, the timeline of the Paycheck Protection Program.

with under 500 employees. To have the loan forgiven, the firms needed to use at least 75% of funds to cover payroll costs, among other requirements that continued to evolve over time. The 75% threshold was changed to 60% in the Paycheck Protection Program Flexibility Act. The PPP “provided a direct incentive for small businesses to keep their workers on payroll” (Lettieri & Lyons, 2020). Beyond payroll, recipients could use the funds for mortgage interest, rent, utilities, worker protection costs, uninsured property damage costs, certain supplier costs, and expenses for operations (U.S. Small Business Administration, 2021). By directing funds to small businesses and their payroll costs, the PPP thus worked as a revenue replacement program, kept credit-constrained businesses open, and stimulated aggregate supply (Park, 2021).

Initially, the PPP earmarked \$349 billion in loans for allocation through the end of 2020. To allow broad access, the loans came with very favorable terms. Qualifying businesses could borrow approximately 2.5 times their average total monthly payroll for each employee, up to a maximum of \$10 million, for a duration of two years at a 1% annual interest rate (Hubbard & Strain, 2020). However, the demand for loans was so overwhelming that the program ran out of allocated funds less than two weeks after it began to disburse loans. In response to the high demand and continued uncertainty, on April 24, 2020, Congress allocated an additional \$231 billion in PPP funding, and the banks started issuing new loans on April 27. Within two weeks of starting round two, the demand peaked with 60% of the additional funds allocated but saw a substantial decline thereafter. When the PPP stopped taking new applications on August 8, 2020, the program had disbursed \$525 billion in loans to over five million firms (Cole, 2020).

The PPP’s Shortcomings & The PPP Flexibility Act

While the administrative details of PPP sounded fairly simple, the actual execution was chaotic and media coverage focused on the program’s apparent inability to provide useful aid to small businesses in need (Park, 2021). As Treasury Secretary Steven Mnuchin and SBA Administrator Jovita Carranza wrote after the first round of the program, “the SBA processed more than 14 years’ worth of loans in less than 14 days” (Mnuchin & Carranza, 2020).

To distribute funds quickly, the U.S. Treasury allowed any existing SBA 7(a) or financial depository institution participating in the program to distribute the loans. In October 2020, a report published by the Select Subcommittee on the Coronavirus Crisis claimed that the Treasury gave explicit instructions for lenders to tap into “their existing customer base” (Select Subcommittee on the Coronavirus Crisis, 2020). The report also states that some lenders including JP Morgan Chase, PNC, and Truist processed large loan applications at over twice the speed of small applications because the internal application process was different for large

businesses (Select Subcommittee on the Coronavirus Crisis, 2020). Though the PPP quickly injected the struggling economy with much needed liquidity, the funds did not necessarily go to the firms and places most in need (Hayashi et al., 2020). Firms that had less cash on hand and reported greater business distress were less likely to receive a PPP loan. Lenders prioritizing other applications exacerbated concerns over the accessibility of PPP loans (Granja et al., 2020; Bartik et al., 2020). Moreover, PPP requirements regarding information about a business, including relevant supporting documents, records, and official forms were overly demanding for resource-constrained, unsophisticated businesses on the verge of shutdown. Additionally, businesses struggling to stay afloat did not have money to meet administrative costs or time to understand the stringent, constantly changing application and forgiveness requirements. In fact, many found the requirement to spend 75% of funds on payroll costs overly restrictive, as it left little for business owners to meet their rent and other immediate operational costs (Freedman, 2020).

In response, Congress approved the Paycheck Protection Program Flexibility Act (PPPFA), which aimed to loosen various requirements for applications and loan forgiveness, with bipartisan support in Congress in June 2020. As it became clear that the crisis would extend well beyond the two months that the program was originally designed to cover, the PPPFA gave businesses more flexibility over when and how they could spend their loans. The SBA also lowered the payroll requirement from the initial forgiveness threshold of 75% to 60%, extended the maturity period for new loans to five years from two, lengthened loan forgiveness periods, and altered other key provisions of the PPP.

The Economic Aid Act

The Economic Aid to Hard-Hit Small Businesses, Nonprofits, and Venues Act (Economic Aid Act) was signed into law in December 2020, and it reopened the Paycheck Protection Program to eligible first-time borrowers (First Draw PPP Loans) and borrowers that had previously received First Draw PPP Loans (Second Draw PPP Loans). The SBA began accepting applications on January 11, 2021, for First Draw PPP Loans, and on January 13, 2021, for Second Draw PPP Loans until March 31, 2021 (later changed to May 31, 2021, under the PPP Extension Act of 2021). The Economic Aid Act permitted loan uses and amended certain PPP requirements, including borrower eligibility criteria and the loans' coverage period, to enhance the program's effectiveness and accessibility (U.S. Department of Treasury, 2021). This iteration of the PPP specifically intended to distribute more funds to smaller businesses with fewer than 300 employees, as opposed to 500. Hence, the program reduced the maximum loan amount from \$10 million to \$2 million (Berwick, Walker, and Wittenberg, 2021). The Biden-Harris administration refocused the

PPP to further target the smallest main street businesses—especially mom-and-pop, women-and-minority-owned businesses—through a 14-day exclusivity period (February 24-March 9). During this period, the lenders focused on reaching out to only businesses and nonprofits with fewer than 20 employees that were left behind in previous rounds. To further broaden the accessibility of the program, SBA eliminated exclusionary restrictions on student loan debt and non-fraud felony convictions and ensured access for non-citizen small business owners (U.S. Small Business Administration, 2021). While early indications show the reform's success in authentically engaging with communities, the economic outcomes are yet unclear.

Prior Literature

One major area of study regarding PPP has been assessing the targeting effects of PPP loans distributed using banks as an intermediary. Taking an instrumental variables (IV) approach to estimate causal effects, Bartik et al. (2020) and Granja et al. (2020) report that banks prioritized lending to firms in better conditions, especially in the first round of the program, as opposed to servicing the businesses in most distress. Specifically, Granja et al. (2020) find that the top four banks distributed less than 3% of total first round loans to small businesses although they held 36% of small business loans prior to PPP. Furthermore, Li and Strahan (2020) use data on lending at the bank level from Call Reports and SBA to show unequal access to program resources as firms with prior banking relationships received earlier access to credit. Joaquim and Netto (2020) provide empirical evidence of heterogeneity in the allocation of PPP funds similar to the results of Bartik et al. (2020).

Given that Congress designed the program to help businesses maintain payroll, several empirical studies assess the short-run and medium-run impact of PPP on employment and other key metrics. Findings show mixed results depending on the research design, the subset of PPP loans studied, the research questions asked, and the economic datasets used. Granja et al. (2020) use loan-level microdata for all PPP loans above \$150,000 and high-frequency administrative employment data to exploit variations in heterogeneity in bank lending. The authors conclude that PPP loans did not go to places most hit by the pandemic, in part due to the way banks distributed loans, and consequently find no substantial effect of PPP on local economic outcomes, including employment improvements. In particular, they claim that more than 90% of workers who benefitted from the program would have still had their jobs without the PPP loan. Other contemporaneous evidence by Chetty et al. (2020) provides similar estimates using firms above and below the 500-employee program eligibility cutoff and a difference-in-differences design to estimate employment effects. The authors find that PPP loans increased employment rates at

eligible firms by only 2% compared to larger, ineligible firms at the cost of \$377,000 per job saved by the PPP. Similar to Granja et al. (2020), the reason that small employment effects are likely is that the vast majority of PPP loans went to firms that would not have laid off many workers with or without the program. Like Chetty et al. (2020), Autor et al. (2020) also use the 500-employee cutoff, comparing PPP-eligible and PPP-ineligible firms using industry-level size thresholds, to study the impact of PPP on employment using a high-frequency administrative dataset provided by the payroll company ADP. Their results indicate that employment effects were insignificant at PPP-eligible firms (increased by 2% to 4.5%) in line with results from Granja et al. (2020) and Chetty et al. (2020).

Hubbard and Strain (2020) use similar commercial high-frequency data from the Dun & Broadstreet Corporation on firms with PPP loans of \$150,000 or greater and find a substantial increase in employment, about 1.8 percentage points, and survival of small businesses in the short run. Bartik et al. (2020) use firm level survey data to quantify how the program affected firms' expectations about survival and resilience and report an increase in firm survival expectations by 14–30 percentage points after receiving PPP. Similarly, Morse and Bartlett (2020) use survey data to offer evidence that the PPP had been effective in the medium-run for the survival of microbusinesses employing fewer than 5 employees. Humphries et al. (2020) also use survey data from small- and medium-sized business owners to highlight that those who applied for a PPP loan were 12 percent more likely to recover within two years and 11 percent less likely to file for bankruptcy in the next six months. Joaquim and Netto (2020), using county level data, find that by the end of the first two rounds of PPP, employment increased approximately by 12.5 percentage points, which corresponds to approximately 7.5 million jobs.

This study adds to the existing research by finding substantial positive impacts of PPP funds under \$150,000 disbursed in 2020 and 2021 on employment and consumer spending across counties. By studying loans under \$150,000, I analyze the impact of PPP on smaller firms and contribute to the limited literature focused on such loans. To the best of my knowledge, there is no empirical work examining the impact of the PPP following its reopening in 2021 after the passage of the Economic Aid Act in December 2020. This study analyzes the impact of PPP over its two years of implementation, and the regressions with interaction effects on the post-Economic Aid Act data examine the effectiveness of the 2021 iteration of the program compared to the 2020 iteration.

DATA COLLECTION

I collected data from the U.S. Small Business Administration, Census Bureau, Bureau of Labor Statistics, United States Department of Agriculture, and Opportunity Insights' Economic Tracker. Although the data came from a multitude of sources, to ensure consistency across all of my data points throughout the entire sample period (January 2020 to June 2021), I collected all of the data for each data category from the same source. For example, all county level unemployment rate data came from the Bureau of Labor Statistics.

All Paycheck Protection Program loan data through January 3, 2022, are available on the U.S. Small Business Administration website. The dataset provides the dollar loan amount and the date approved for each loan at the zip code level. I aggregated those loan amounts to the county level and added up loans by month for my study. I also used population data by county from the United States Census Bureau published in 2019 to find the monthly loan amount by county per capita. Given that Congress intended the program to support small businesses, I focused my study on PPP loans under \$150,000 (Guida, 2020).

To measure economic outcomes, I used county unemployment rates from the Bureau of Labor Statistics as one of my metrics. I also used credit/debit card spending data, available on a daily frequency, from Affinity Solutions from January 2020 until September 2021. Detailed information on the construction of the series is available on the Opportunity Insights' Economic Tracker website. The Economic Tracker uses "anonymized data from several private companies to construct indices of spending, employment, and other outcomes" (Chetty et al., 2020). The Opportunity Insights team reports changes in spending indexed to the period January 4-31, 2020, in such a way that a value of -0.5, for instance, refers to a 50% decline in spending level compared to January 2020. Additionally, I controlled for county demographics, including the 2019 median household income from the United States Department of Agriculture and the percent of adults in a county with bachelor's degrees or higher data from the Census Bureau.

I used the variables described above, including loan amounts by county, county unemployment rates, changes in spending indexed to January 2020 at county level, median household income, and percent of adults in a county with bachelor's degrees or higher, in the regression models to analyze how the labor and product market responded to PPP loan disbursement at a county level.

METHODS

In my regressions, I used two primary independent variables: *ln_ppp_amount_1* (natural log of PPP loans data with one-month lag) and *ln_ppp_amount_2* (natural log of PPP loans data with two-month lag). I used lagged PPP amounts in my regressions because it likely takes some time for the PPP loans to impact the local economy. The two-month lag accounts for this gradual economic impact at the county level. Taking a natural log of PPP loan amounts helps to reduce the impact of outliers as large loans to certain counties might skew the overall data. In order to answer the first question, I regressed *chg_unemp_rate* (month-on-month change in unemployment rate) on *ln_ppp_amount_1* and *ln_ppp_amount_2* over the sample period. Similarly, to answer my second question, I regressed *spend_avg* (average daily changes in spending relative to January 2020) and *spend_cumul* (cumulative daily changes in spending relative to January 2020) on *ln_ppp_amount_1* and *ln_ppp_amount_2* over the sample period.

I run multiple regression models in the subsequent tables: models (1) and (3) use pooled ordinary least squares (OLS) regression on PPP loan amounts with one-month and two-month lag respectively, while models (2) and (4) use fixed effect (FE) regression on PPP loan amounts with one-month and two-month lag respectively. In the OLS models, I controlled for county demographics, including education (*Per_bachelors_plus*) and median household income (*ln_county_income*). The standard errors are corrected for heteroscedasticity by clustering at the county level. Using the within estimator in FE regression, I study how the economic outcome within a county responds to PPP loans for that same county. FE removes the effect of time-invariant characteristics that may impact or bias the predictor or outcome variables so we can assess the net effect of the predictors on the outcome variable.

To answer my final question, I divide the sample period into pre-Economic Aid Act (April 2021-August 2021) and post-Economic Aid Act (January 2021 to June 2021) periods.

EMPIRICAL RESULTS

PPP Funds and Employment Outcomes

Table 1 PPP Loan Amounts and Changes in Unemployment Rate (Month over Month)

	(1)	(2)	(3)	(4)
	chg_unemp_rate	chg_unemp_rate	chg_unemp_rate	chg_unemp_rate
ln_ppp_amount_1	-0.00065*** (-14.74)	-0.00087*** (-15.53)		
Per_bachelors_plus	0.00500*** (3.71)		0.00352*** (3.66)	
ln_county_income	-0.00091* (-1.85)		-0.00218*** (-5.94)	
ln_ppp_amount_2			-0.00036*** (-9.65)	-0.00036*** (-6.91)
Constant	0.01053** (2.04)	0.00467*** (6.03)	0.02161*** (5.69)	-0.00131* (-1.79)
Adjusted R-square	0.007	0.005	0.004	-0.028
N	28560	28560	28560	28560

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

In Table 1, the coefficients on *ln_ppp_amount_1* and *ln_ppp_amount_2* are negative across models (1) and (2) and models (3) and (4) respectively. These findings are significant at the 1% level, suggesting a smaller increase in unemployment rate in participating counties. I conclude that larger PPP loans in counties enable small businesses to maintain their payroll and hire back employees the businesses may have laid off.

It is also interesting to note the positive coefficient on *Per_bachelors_plus* in models (1) and (3) in Table 1, which indicates a higher change in unemployment levels for more educated individuals. These findings, however, are not surprising given the period of the Great Resignation set off by the COVID-19 pandemic, where individuals with more means and opportunities left the workforce for myriad reasons in the past two years, e.g., opting for early retirement, launching a new business, staying home to address childcare needs.

PPP Funds and Consumer Spending Outcomes

Table 2 PPP Loan Amounts and Monthly Avg of Daily Consumer Spending

	(1)	(2)	(3)	(4)
	<i>spend_avg</i>	<i>spend_avg</i>	<i>spend_avg</i>	<i>spend_avg</i>
<i>ln_ppp_amount_1</i>	-0.00131 (-1.33)	-0.00025 (-0.37)		
<i>Per_bachelors_plus</i>	-0.03503 (-0.69)		-0.01971 (-0.37)	
<i>ln_county_income</i>	-0.09153*** (-4.16)		-0.09411*** (-4.05)	
<i>ln_ppp_amount_2</i>			0.00239** (2.32)	0.00449*** (7.02)
Constant	1.06578*** (4.63)	0.03639*** (3.82)	1.05499*** (4.33)	-0.01394 (-1.51)
Adjusted R-square	0.017	0.514	0.014	0.571
N	16763	16763	16763	16763

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

In Table 2, the coefficients on *ln_ppp_amount_1* in models (1) and (2) are not statistically different from zero. The coefficient on *ln_ppp_amount_2* is positive in models (3) and (4) and statistically significant at 5% and 1% levels respectively. These findings show the positive relation between consumer spending and PPP loans at a county level, implying that the Paycheck Protection Program stimulated consumer spending in participating counties. A one percent change in *ln_ppp_amount_2* leads to a positive change of 0.00239 percent in *spend_avg*. While this change might not seem like much at a first glance, when compared to mean *spend_avg* (Appendix B) of 0.012, it represents an increase of approximately 19.73%. I argue that this finding is economically meaningful.

Table 3 PPP Loan Amounts and Monthly Cumulative of Daily Consumer Spending

	(1)	(2)	(3)	(4)
	spend_cumul	spend_cumul	spend_cumul	spend_cumul
ln_ppp_amount_1	-0.04192 (-1.41)	-0.01320 (-0.65)		
Per_bachelors_plus	-1.23612 (-0.78)		-0.86595 (-0.51)	
ln_county_income	-2.62616*** (-3.93)		-2.71664*** (-3.80)	
ln_ppp_amount_2			0.07790** (2.46)	0.14155*** (7.05)
Constant	30.75982*** (4.41)	1.18835*** (4.04)	30.49789*** (4.08)	-0.47832* (-1.65)
Adjusted R-square	0.017	0.503	0.013	0.564
N	16451	16451	16419	16419

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table 3 shows results similar to Table 2, except with higher coefficients that reflect the monthly change as opposed to daily change.

Furthermore, it is interesting to note the negative coefficient on *ln_county_income* in models (1) and (3) in Table 3, indicating spending is more in low-income counties during the pandemic. This finding is consistent with contemporaneous work by Chetty et al. (2020), Alexander and Karger (2020), and Cox et al. (2020). These findings suggest that high-income households cut spending more in percentage terms and accounted for a much larger share of the decline in total spending in the U.S. than low-income households by reducing discretionary spending concentrated in services that require in-person physical interaction because of health concerns and their ability to self-isolate more easily than lower-income individuals.

2020 Iteration versus 2021 Iteration of PPP

Table 4 PPP Loan Amounts and Change in Unemployment Rate (MoM) with Interaction Effects

	(1)	(2)	(3)	(4)
	chg_unemp_rate	chg_unemp_rate	chg_unemp_rate	chg_unemp_rate
ln_ppp_amount_1	-0.00178*** (-30.60)	-0.00242*** (-31.62)		
ln_ppp_amount_1_post	0.00098*** (66.88)	0.00101*** (61.36)		
Per_bachelors_plus	0.00929*** (6.61)		0.00661*** (6.69)	
ln_county_income	0.00001 (0.02)		-0.00151*** (-4.07)	
ln_ppp_amount_2			-0.00117*** (-25.66)	-0.00147*** (-22.38)
ln_ppp_amount_2_post			0.00071*** (66.33)	0.00072*** (59.59)
Constant	0.00787 (1.50)	0.01872*** (19.36)	0.01968*** (5.12)	0.00872*** (10.33)
Adjusted R-square	0.188	0.214	0.137	0.122
N	28560	28560	28560	28560

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table 5 PPP Loan Amounts and Monthly Avg of Daily Consumer Spending with Interaction Effects

	(1)	(2)	(3)	(4)
	spend_avg	spend_avg	spend_avg	spend_avg
ln_ppp_amount_1	-0.01440*** (-14.45)	-0.01706*** (-33.41)		
ln_ppp_amount_1_post	0.01272*** (62.28)	0.01280*** (61.63)		
Per_bachelors_plus	0.00489 (0.10)		0.01801 (0.33)	
ln_county_income	-0.08557*** (-3.89)		-0.08848*** (-3.81)	
ln_ppp_amount_2			-0.00999*** (-9.53)	-0.01135*** (-22.75)
ln_ppp_amount_2_post			0.01203*** (57.70)	0.01206*** (56.95)
Constant	1.08178*** (4.70)	0.18105*** (25.19)	1.07010*** (4.39)	0.12233*** (17.56)
Adjusted R-square	0.249	0.770	0.217	0.795
N	16763	16763	16763	16763

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table 6 PPP Loan Amounts and Monthly Cumulative of Daily Consumer Spending with Interaction Effects

	(1)	(2)	(3)	(4)
	spend_cumul	spend_cumul	spend_cumul	spend_cumul
ln_ppp_amount_1	-0.44060*** (-14.63)	-0.52394*** (-33.14)		
ln_ppp_amount_1_post	0.38802*** (62.25)	0.39031*** (61.61)		
Per_bachelors_plus	0.00250 (0.00)		0.37625 (0.22)	
ln_county_income	-2.45372*** (-3.67)		-2.54356*** (-3.56)	
ln_ppp_amount_2			-0.30624*** (-9.47)	-0.35566*** (-22.69)
ln_ppp_amount_2_post			0.36881*** (56.80)	0.37015*** (56.28)
Constant	31.33932*** (4.49)	5.57423*** (25.08)	31.01183*** (4.15)	3.87240*** (17.73)
Adjusted R-square	0.253	0.765	0.220	0.792
N	16451	16451	16419	16419

t statistics in parentheses

* p<0.10, ** p<0.05, *** p<0.01

In Tables 4, 5, and 6, the positive coefficient on the interaction term *ln_ppp_amount_1_post* and *ln_ppp_amount_2_post* in models (1) and (2) and models (3) and (4) respectively suggests increased program effectiveness post Economic Aid Act in 2021.

DISCUSSION AND CONCLUSION

The PPP was first enacted in 2020, when the full economic impacts of the pandemic were still unknown, to provide small businesses loans quickly to help them stay open and keep their employees working. For the sake of expediency, the program was up and running even before all the details were fully fleshed out. As Pacific West Bank CEO Terry Peterson notes, "It's like building an airplane while it's flying" (Kish, 2020). Almost two years after the program's launch, the question of whether the \$800 billion Paycheck Protection Program was worth it is still under debate.

My findings show that PPP funds had statistically significant and economically substantial impacts on the consumer and labor markets during the pandemic. Most of the empirical work so far exploits the 500-employee eligibility cutoff for PPP, not considering the average treatment effect across all firm sizes. This paper contributes to the existing literature by analyzing the economic outcomes of PPP loans below \$150,000. My study also analyzes the 2021 loan amounts. I find pronounced increased effectiveness in the 2021 iteration of the PPP.

Nonetheless, the results come with several caveats. My empirical results are not causal in nature, even though I addressed omitted correlated variables, to some extent, by using fixed effect regressions. Additionally, since I only analyzed the counties that received PPP loans, my data can have sample selection biases to the extent that PPP receiving counties are systematically different from non-recipient counties.

A couple of unexplored avenues remain for future work. First, researchers could expand the study by examining how local politics and COVID vaccines affected the impact of PPP loans on the local economy. Second, examining the likelihood of survival of small businesses that received PPP funds in the near term could additionally measure the effectiveness and overall welfare effect of the program. As more data becomes available, continued research work on PPP is not just important for the COVID-19 pandemic, but rather can also equip policymakers to better respond to the next crisis or recession.

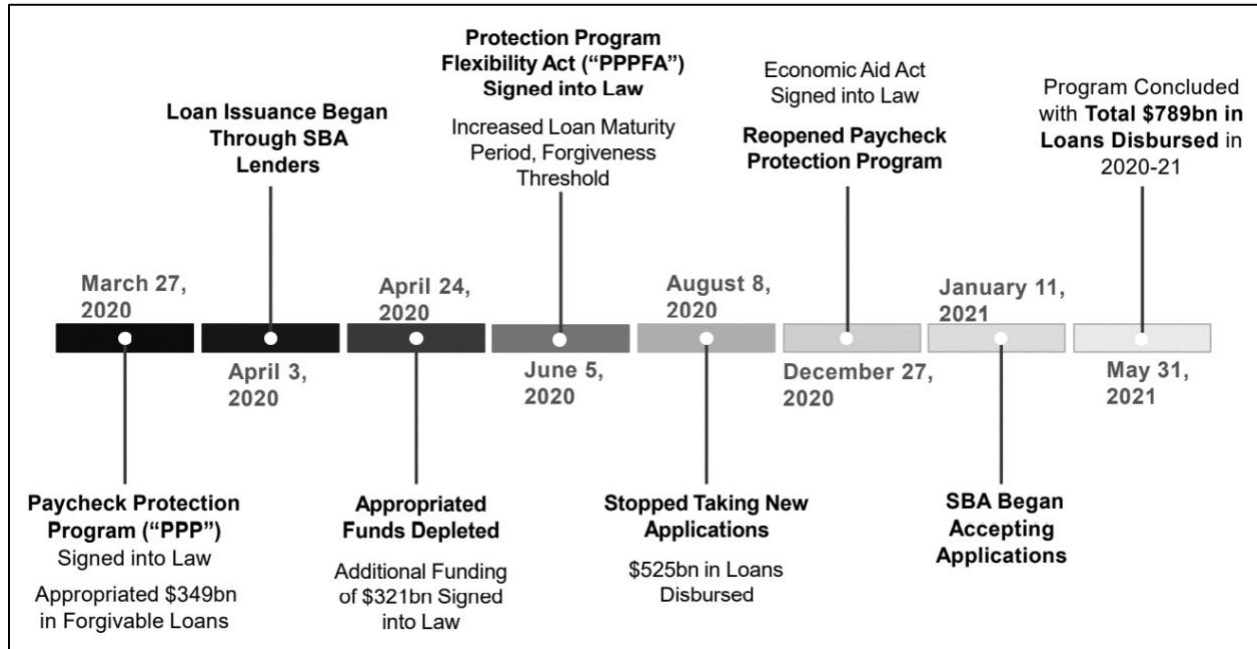
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Appendix A

Paycheck Protection Program Timeline



Appendix B

Summary Statistics

	Observations	Mean	Std. Dev	Min	Max	Median
ppp_amount	28561	9685239.889	47995908.336	300.000	2557579811.450	1165213.375
spend_avg	33241	0.012	0.184	-1.042	0.724	0.006
spend_cumul	30888	0.385	5.729	-32.298	22.444	0.170
chg_unemp_rate	55044	0.000	0.025	-0.183	0.324	-0.002