

A Study of Community Bank-originated PPP Loans on Bankruptcy Rates

Thomas Yu Chow Tam
Shun Tomita
Jamie (Jeong Yeon) Lim

Faculty Advisor: Gabriela Gongora-Svartzman, Ph.D.

May 5th, 2022

AGENDA

- I. Introduction**
- II. Datasets**
- III. Exploratory Data Analysis**
- IV. Statistical Analysis**
- V. Conclusion & Policy Implications**



I. Introduction



P&G's
PAMELA'S *Upstreet*

**SORRY
WE ARE CLOSED
FOR
CORONA VIRUS**

CORONA VIRUS

COVID-19 PANDEMIC

SMALL BUSINESS IMPACT

1 in 5
TWO MONTHS AWAY
FROM CLOSING

SOURCE: US CHAMBER OF COMMERCE

ABC News TV Report on May 14, 2020

Hypothesis

“Communities with higher proportions of community bank-originated PPP loans have lower bankruptcy rates”



Community Banks (CBs)

- Closer relationship with local businesses¹
- Better understanding of local businesses financial needs
- Faster decision-making compared to larger banks



Paycheck Protection Program (PPP)

- Helps small businesses keep their employees on payroll
- Eligible for full loan forgiveness when 60% spent on payroll

1. Federal Deposit Insurance Corporation. "FDIC Community Banking Study." December 2020.



II. Datasets

PPP data

- Full PPP dataset provided by SBA
- PPP loan dataset by CSBS

→ Combined two PPP datasets to obtain the community bank indicator

*Merged two datasets
using **county FIPS code***



Bankruptcy data

- Bankruptcy filings data by county provided by the United States Courts

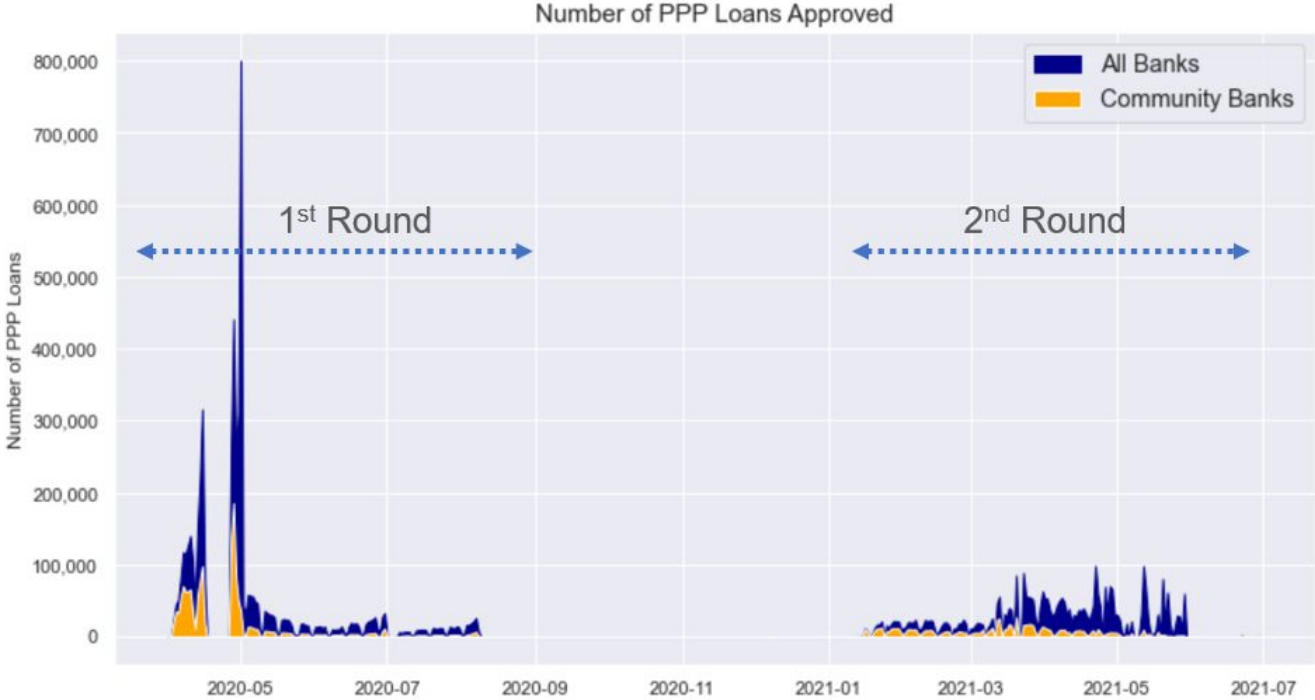
{ Business bankruptcy
Total bankruptcy
= Business + Non-Business

The slide features two decorative lines. One line starts from the left edge, extends horizontally to the right, and then diagonally upwards to the right. The second line starts from the left edge, extends horizontally to the right, and then diagonally downwards to the right. Both lines are thin and light gray.

III. Exploratory Data Analysis

1. PPP data

1) Number of PPP Loans Approved across First Draw Period



1. PPP data

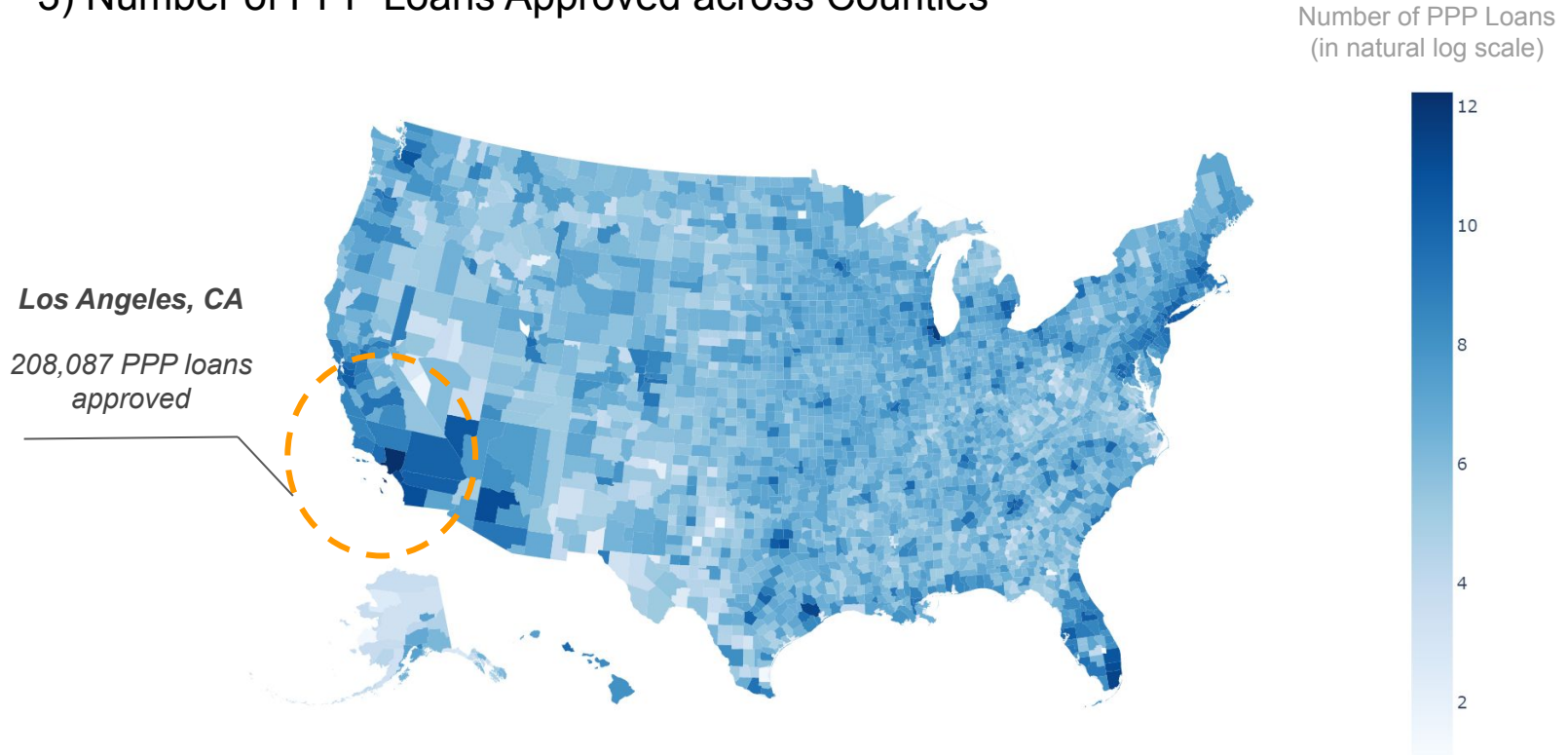
2) Number/Share of PPP First Draw Loans with Date Approved in First Two Months

	First Draw PPP Loans with Date Approved in first two months	First Draw PPP Loans in Entire PPP Period	Share of First Draw PPP Loans with Date Approved in first two months
Total Number of PPP Loans	4,404,126	8,614,374	51.13%
Total Initial Approval Amount of PPP Loans	\$504 billion	\$589 billion	85.60%

First draw PPP loans are heavily concentrated in the first two months, in terms of number and amount

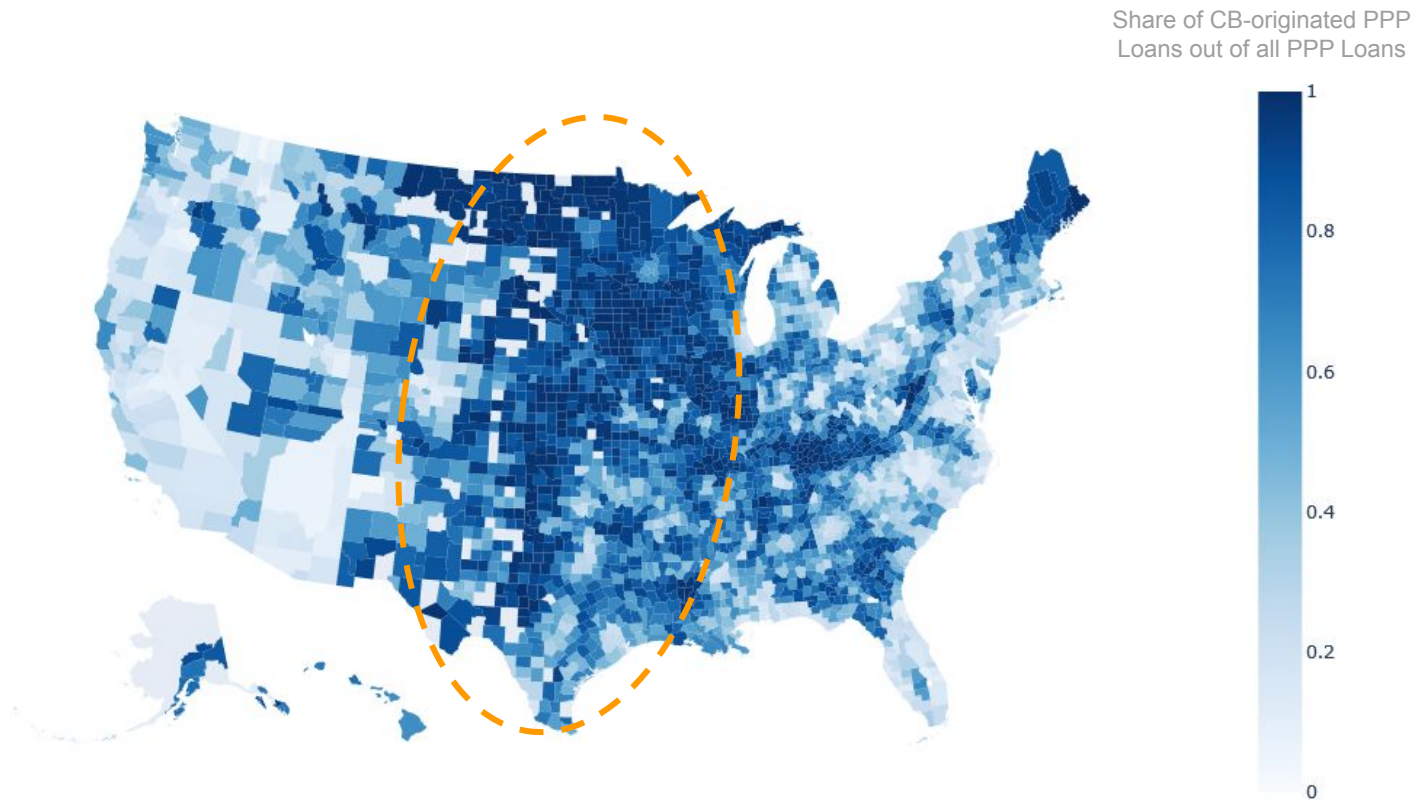
1. PPP data

3) Number of PPP Loans Approved across Counties



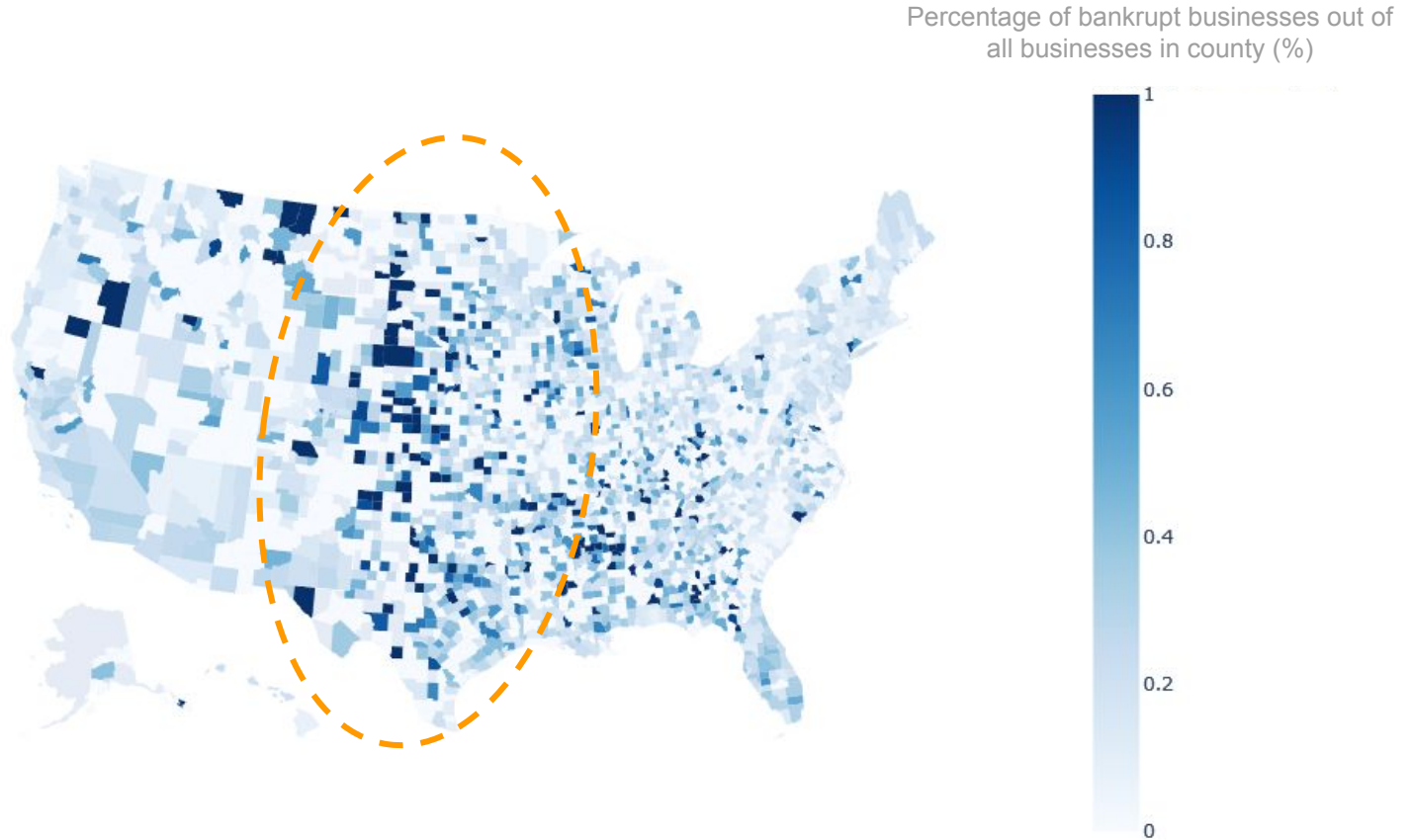
1. PPP data

4) Share of PPP Loans Provided by Community Banks across Counties



2. Bankruptcy data

1) Business Bankruptcy Rates across Counties



IV. Statistical Analysis

■ Model

- Results & Interpretations
- Limitations

Model - Specification

$$Y_i = \alpha + \beta_1 CBPercentage_i + \beta_2 Population_i + \beta_3 GDP_i + \beta_4 NumBiz_i + \sum_t \gamma_t CovidCases_{it} + e_i$$

Y_i the outcome variable, the number of total bankruptcy / business bankruptcy in county i . The data in four different periods are used.

$CBPercentage_i$ the variable of interest, the percentage of the number/amount of loans originated by community banks in county i (two different variables of interest)

Model - Specification

$$Y_i = \alpha + \beta_1 CBPercentage_i + \beta_2 Population_i + \beta_3 GDP_i + \beta_4 NumBiz_i + \sum_t \gamma_t CovidCases_{it} + e_i$$

$Population_i$ population in county i as of April 1, 2020

GDP_i GDP in county i in 2020

$NumBiz_i$ the number of businesses in county i in 2019

$CovidCases_{it}$ the number of Covid-19 cases in county i in period t

Model - Variations

	Total Bankruptcy	Business Bankruptcy
Without State-fixed Effects	<i>Regression 1</i>	<i>Regression 2</i>
With State-fixed Effects	<i>Regression 3</i>	<i>Regression 4</i>

Model - Variations

	Total Bankruptcy	Business Bankruptcy
Without State-fixed Effects	<i>Regression 1</i>	<i>Regression 2</i>
With State-fixed Effects	<i>Regression 3</i>	<i>Regression 4</i>

Model - Rolling Window Regression

Period Number	0	1	2	3	4	5	6	7
Time Period	Jan 01, 2020 - Mar 31, 2020	Apr 01, 2020 - Jun 30, 2020	July 01, 2020 - Sep 31, 2020	Oct 01, 2020 - Dec 31, 2020	Jan 01 2021 - Mar 31, 2021	Apr 01, 2021 - Jun 30, 2021	July 01, 2021 - Sep 30, 2021	Oct 01, 2021 - Dec 31, 2021

Outcome Variables

Bankruptcy Period 1		Bankruptcy in Period 1-4 (1)						
Bankruptcy Period 2			Bankruptcy in Period 2-5 (2)					
Bankruptcy Period 3				Bankruptcy in Period 3-6 (3)				
Bankruptcy Period 4					Bankruptcy in Period 4-7 (4)			

Explanatory Variables

(Based on Date Approved) The percentage of the number/amount of loans originated by community banks in county <i>i</i> and period <i>j</i>	NA (PPP not yet started)	CB_percentag e1	CB_percentag e2	CB_percentag e3	CB_percentag e4	CB_percentag e5	NA (PPP ended)	
Covid-19 cases for county <i>i</i> and period <i>j</i>	CovidCases0	CovidCases1	CovidCases2	CovidCases3	CovidCases4	CovidCases5	CovidCases6	CovidCases7

Model - Rolling Window Regression (Period 1 - 4)

Period Number	0	1	2	3	4	5	6	7
Time Period	Jan 01, 2020 - Mar 31, 2020	Apr 01, 2020 - Jun 30, 2020	July 01, 2020 - Sep 31, 2020	Oct 01, 2020 - Dec 31, 2020	Jan 01 2021 - Mar 31, 2021	Apr 01, 2021 - Jun 30, 2021	July 01, 2021 - Sep 30, 2021	Oct 01, 2021 - Dec 31, 2021

Outcome Variables

Bankruptcy Period 1		Bankruptcy in Period 1-4 (1)						
Bankruptcy Period 2			Bankruptcy in Period 2-5 (2)					
Bankruptcy Period 3				Bankruptcy in Period 3-6 (3)				
Bankruptcy Period 4					Bankruptcy in Period 4-7 (4)			

Explanatory Variables

(Based on Date Approved) The percentage of the number/amount of loans originated by community banks in county <i>i</i> and period <i>j</i>	NA (PPP not yet started)	CB_percentag e1	CB_percentag e2	CB_percentag e3	CB_percentag e4	CB_percentag e5	NA (PPP ended)	
Covid-19 cases for county <i>i</i> and period <i>j</i>	CovidCases0	CovidCases1	CovidCases2	CovidCases3	CovidCases4	CovidCases5	CovidCases6	CovidCases7

Model - Rolling Window Regression (Period 2 - 5)

Period Number	0	1	2	3	4	5	6	7
Time Period	Jan 01, 2020 - Mar 31, 2020	Apr 01, 2020 - Jun 30, 2020	July 01, 2020 - Sep 31, 2020	Oct 01, 2020 - Dec 31, 2020	Jan 01 2021 - Mar 31, 2021	Apr 01, 2021 - Jun 30, 2021	July 01, 2021 - Sep 30, 2021	Oct 01, 2021 - Dec 31, 2021

Outcome Variables

Bankruptcy Period 1		Bankruptcy in Period 1-4 (1)						
Bankruptcy Period 2			Bankruptcy in Period 2-5 (2)					
Bankruptcy Period 3				Bankruptcy in Period 3-6 (3)				
Bankruptcy Period 4					Bankruptcy in Period 4-7 (4)			

Explanatory Variables

(Based on Date Approved) The percentage of the number/amount of loans originated by community banks in county <i>i</i> and period <i>j</i>	NA (PPP not yet started)	CB_percentag e1	CB_percentag e2	CB_percentag e3	CB_percentag e4	CB_percentag e5	NA (PPP ended)	
Covid-19 cases for county <i>i</i> and period <i>j</i>	CovidCases0	CovidCases1	CovidCases2	CovidCases3	CovidCases4	CovidCases5	CovidCases6	CovidCases7

Model - Rolling Window Regression (Period 3 - 6)

Period Number	0	1	2	3	4	5	6	7
Time Period	Jan 01, 2020 - Mar 31, 2020	Apr 01, 2020 - Jun 30, 2020	July 01, 2020 - Sep 31, 2020	Oct 01, 2020 - Dec 31, 2020	Jan 01 2021 - Mar 31, 2021	Apr 01, 2021 - Jun 30, 2021	July 01, 2021 - Sep 30, 2021	Oct 01, 2021 - Dec 31, 2021

Outcome Variables

Bankruptcy Period 1		Bankruptcy in Period 1-4 (1)						
Bankruptcy Period 2			Bankruptcy in Period 2-5 (2)					
Bankruptcy Period 3				Bankruptcy in Period 3-6 (3)				
Bankruptcy Period 4					Bankruptcy in Period 4-7 (4)			

Explanatory Variables

(Based on Date Approved) The percentage of the number/amount of loans originated by community banks in county <i>i</i> and period <i>j</i>	NA (PPP not yet started)	CB_percentag e1	CB_percentag e2	CB_percentag e3	CB_percentag e4	CB_percentag e5	NA (PPP ended)	
Covid-19 cases for county <i>i</i> and period <i>j</i>	CovidCases0	CovidCases1	CovidCases2	CovidCases3	CovidCases4	CovidCases5	CovidCases6	CovidCases7

Model - Rolling Window Regression (Period 4 - 7)

Period Number	0	1	2	3	4	5	6	7
Time Period	Jan 01, 2020 - Mar 31, 2020	Apr 01, 2020 - Jun 30, 2020	July 01, 2020 - Sep 31, 2020	Oct 01, 2020 - Dec 31, 2020	Jan 01 2021 - Mar 31, 2021	Apr 01, 2021 - Jun 30, 2021	July 01, 2021 - Sep 30, 2021	Oct 01, 2021 - Dec 31, 2021

Outcome Variables

Bankruptcy Period 1		Bankruptcy in Period 1-4 (1)						
Bankruptcy Period 2			Bankruptcy in Period 2-5 (2)					
Bankruptcy Period 3				Bankruptcy in Period 3-6 (3)				
Bankruptcy Period 4					Bankruptcy in Period 4-7 (4)			

Explanatory Variables

(Based on Date Approved) The percentage of the number/amount of loans originated by community banks in county <i>i</i> and period <i>j</i>	NA (PPP not yet started)	CB_percentag e1	CB_percentag e2	CB_percentag e3	CB_percentag e4	CB_percentag e5	NA (PPP ended)	
Covid-19 cases for county <i>i</i> and period <i>j</i>	CovidCases0	CovidCases1	CovidCases2	CovidCases3	CovidCases4	CovidCases5	CovidCases6	CovidCases7



IV. Statistical Analysis

- Model
- **Results & Interpretations**
- Limitations

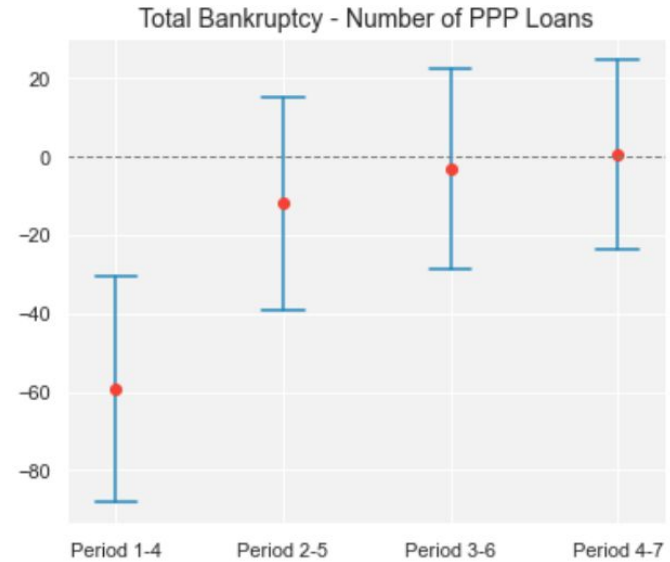
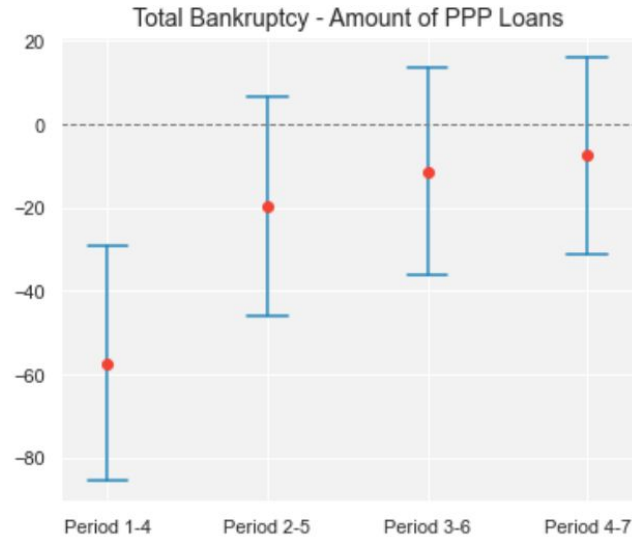
Regression 1: Without State-Fixed Effects, Outcome Variable: Total Bankruptcy

	Bankruptcy in Period 1-4 (1)	Bankruptcy in Period 2-5 (2)	Bankruptcy in Period 3-6 (3)	Bankruptcy in Period 4-7 (4)
Percentage of loan by CB				
the number of loans in Periods 1-4	- 59.1809*** (14.676)			
the number of loans in Periods 1-5		-12.0121 (13.796)	- 3.3380 (13.061)	0.3975 (12.356)
the amount of loans in Periods 1-4	- 57.4220*** (14.303)			
the amount of loans in Periods 1-5		-19.7291 (13.433)	-11.4549 (12.7)	-7.5245 (12.037)
N	2984	2976	2971	2952

Coefficient estimates are statistically significant in period 1-4

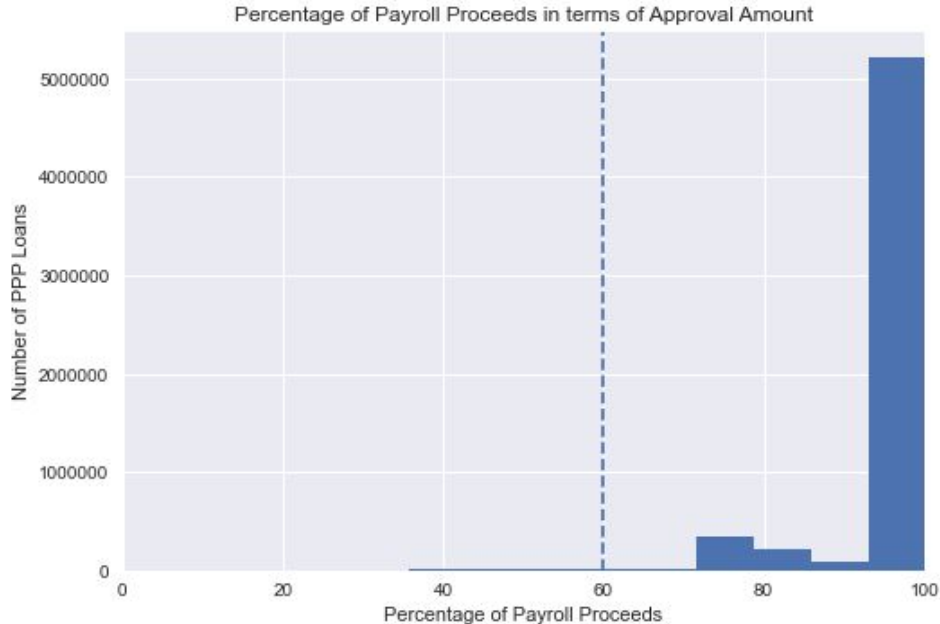
Regression 1: Without State-Fixed Effects, Outcome Variable: [Total Bankruptcy](#)

95% Confidence Intervals of Coefficient Estimates



Interpretation 1:

Negative coefficients suggest CB-originated PPP loans helped employees in small businesses



Possible Explanation:

Majority of the PPP loan proceeds went to payroll proceeds

- for 5,252,366 (about 88.5%) PPP loans, 90% of the loan amount was allocated for payroll costs

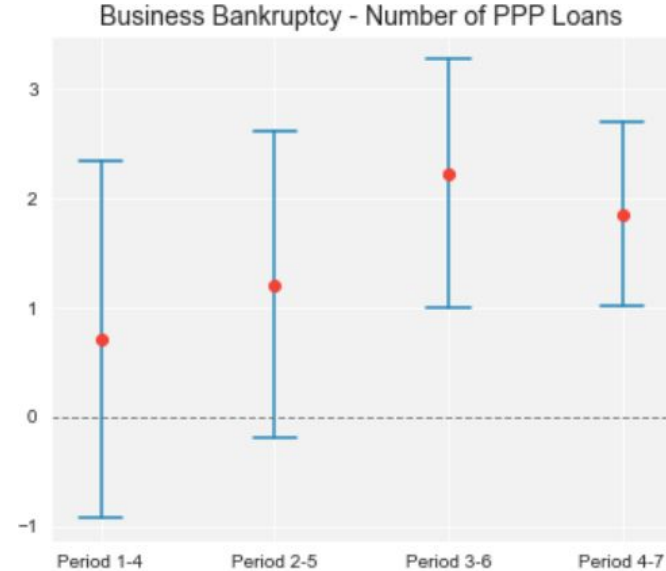
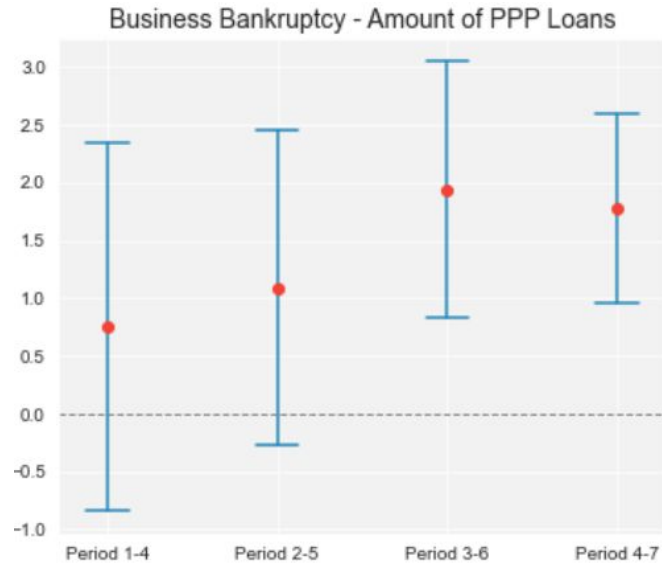
Regression 2: Without State-Fixed Effects, Outcome Variable: Business Bankruptcy

	Bankruptcy in Period 1-4 (1)	Bankruptcy in Period 2-5 (2)	Bankruptcy in Period 3-6 (3)	Bankruptcy in Period 4-7 (4)
Percentage of loan by CB				
the number of loans in Periods 1-4	0.7049 (0.834)			
the number of loans in Periods 1-5		1.2044 (0.715)	2.1283*** (0.581)	1.8532*** (0.429)
the amount of loans in Periods 1-4	0.7516 (0.813)			
the amount of loans in Periods 1-5		1.0908 (0.696)	1.9364*** (0.565)	1.7720*** (0.418)
N	2984	2976	2971	2952

Coefficient estimates are not negative, and not statistically significant in period 1-4

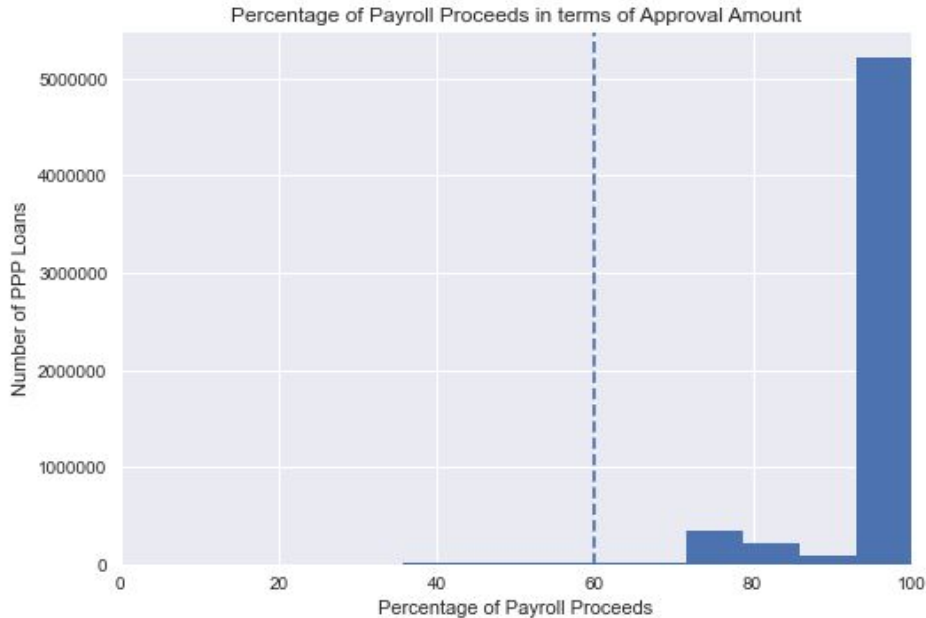
Regression 2: Without State-Fixed Effects, Outcome Variable: **Business Bankruptcy**

95% Confidence Intervals of Coefficient Estimates



Interpretation 2:

Coefficients suggest PPP's nature may have limited CB's role in reducing business bankruptcy



Possible Explanations:

Businesses were encouraged to spend at least 60% of the proceeds on payroll costs to be eligible for full loans forgiveness



Affected the usage of PPP loans and weakened the association between the share of CB-originated PPP loans and business bankruptcy

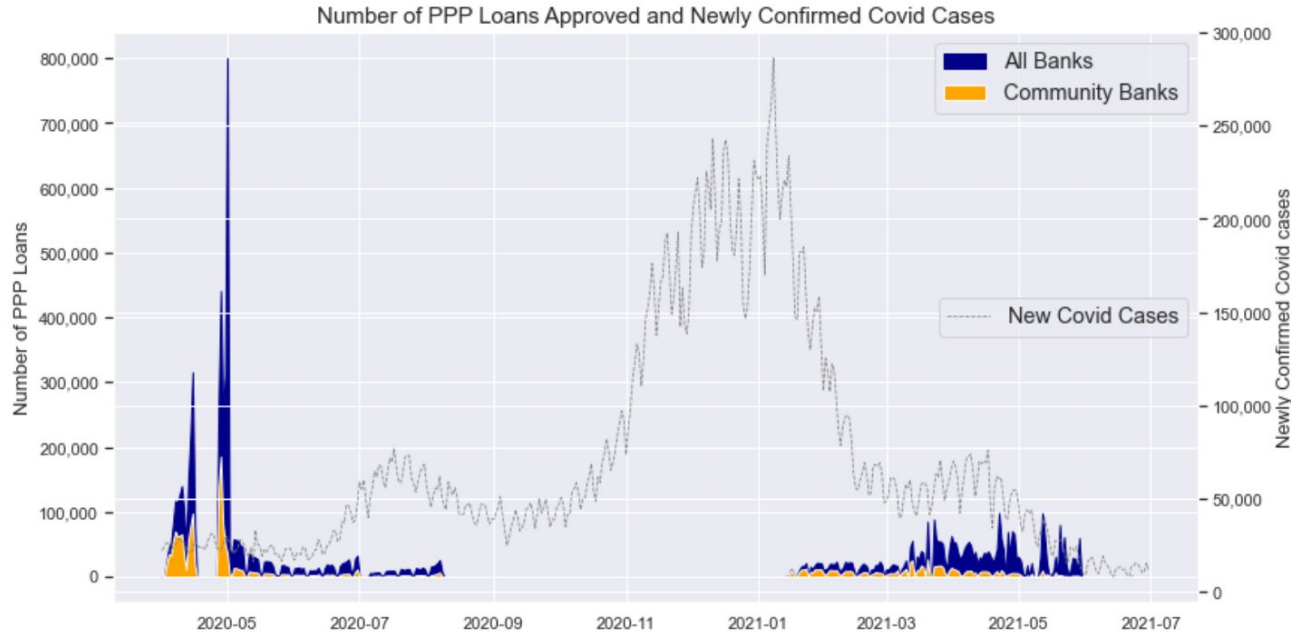
Regression 1: Without State-Fixed Effects, Outcome Variable: Total Bankruptcy

	Bankruptcy in Period 1-4 (1)	Bankruptcy in Period 2-5 (2)	Bankruptcy in Period 3-6 (3)	Bankruptcy in Period 4-7 (4)
Percentage of loan by CB				
the number of loans in Periods 1-4	- 59.1809*** (14.676)			
the number of loans in Periods 1-5		-12.0121 (13.796)	- 3.3380 (13.061)	0.3975 (12.356)
the amount of loans in Periods 1-4	- 57.4220*** (14.303)			
the amount of loans in Periods 1-5		-19.7291 (13.433)	-11.4549 (12.7)	-7.5245 (12.037)
N	2984	2976	2971	2952

Magnitude of
coefficient
diminishes
over time

Interpretation 3:

Diminishing association between PPP loans and total bankruptcy over time



Possible Explanations:

- Gap between Round 1 and Round 2 of First Draw PPP
- Surge in COVID-19 cases in the same period
- First draw PPP loans are heavily concentrated in the first two months, in terms of both number and approval amount



IV. Statistical Analysis

- Model
- Results & Interpretations
- **Limitations**

Limitations of Analysis

Detailed characteristics of small businesses are unknown

- These characteristics also affect the probability of businesses going bankrupt and may cause endogeneity issues

County-level monthly or quarterly bankruptcy data is unavailable

- We are not able to analyze the immediate impacts of PPP loans on bankruptcies

Other SBA COVID-19 relief programs which may also affect bankruptcies are not included

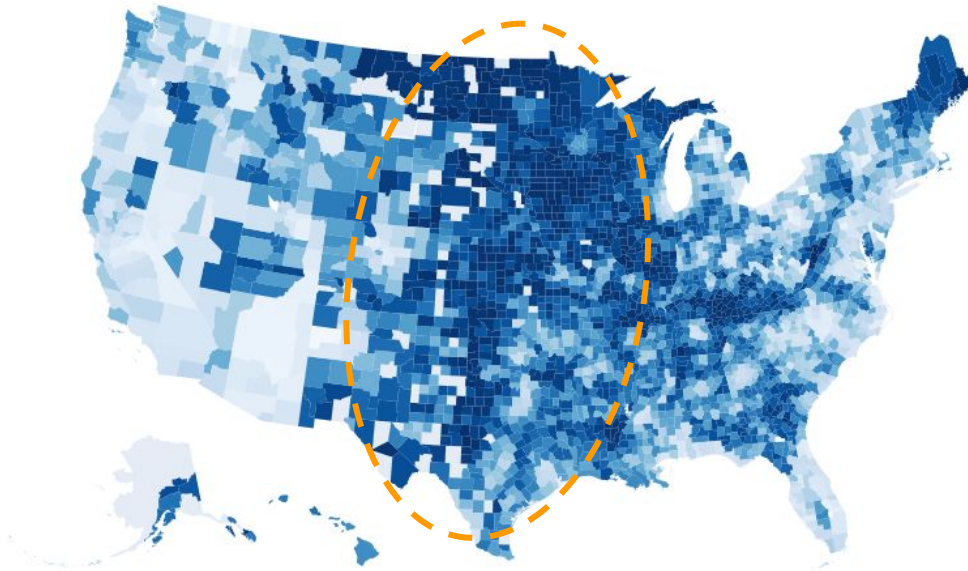
- Potential omitted variable bias



V. Conclusion & Policy Implications

1. Role of Community Banks in PPP

Share of PPP loans originated by CB



- Community banks might have helped local communities and local employees
- Especially in dark blue-shaded counties, community banks played outsized role

2. Helping Businesses



PPP

- The effects of CB-originated PPP loans on preventing businesses bankruptcy are inconclusive
- PPP loans were specifically designed to maintain employment



SBA Debt Relief

- Community banks might have contributed to reducing business bankruptcy through other policies such as Debt Relief

2. Helping Businesses

Covid-19 Relief Loans or Grants by SBA



Shuttered Venues Operator Grant

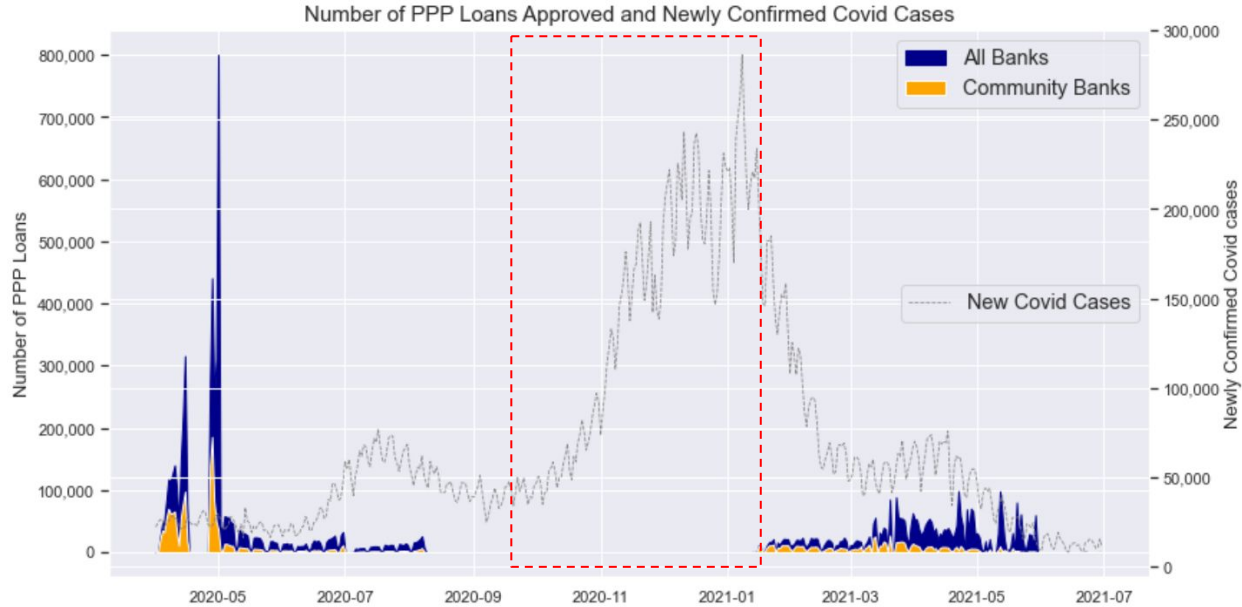


COVID-19 Economic Injury Disaster
Loan (EIDL)



Restaurant Revitalization Fund
(RRF)

3. Responsiveness of PPP



→ Timely interventions against Covid-19 might be critical in mitigating the economic shock and helping communities



**Thank you
Q&A**

References

Angrist, Joshua David, and Jörn-Steffen Pischke. 2015. *Mastering 'metrics: the path from cause to effect*.

Bartik, Alexander W., Cullen, Zoe, Glaeser, Edward L., Luca, Michael, Stanton, Christopher and Adi Sunderam. 2020. *The Targeting and Impact of Paycheck Protection Program Loans to Small Businesses.*: Harvard Business School Working Paper 21-021.

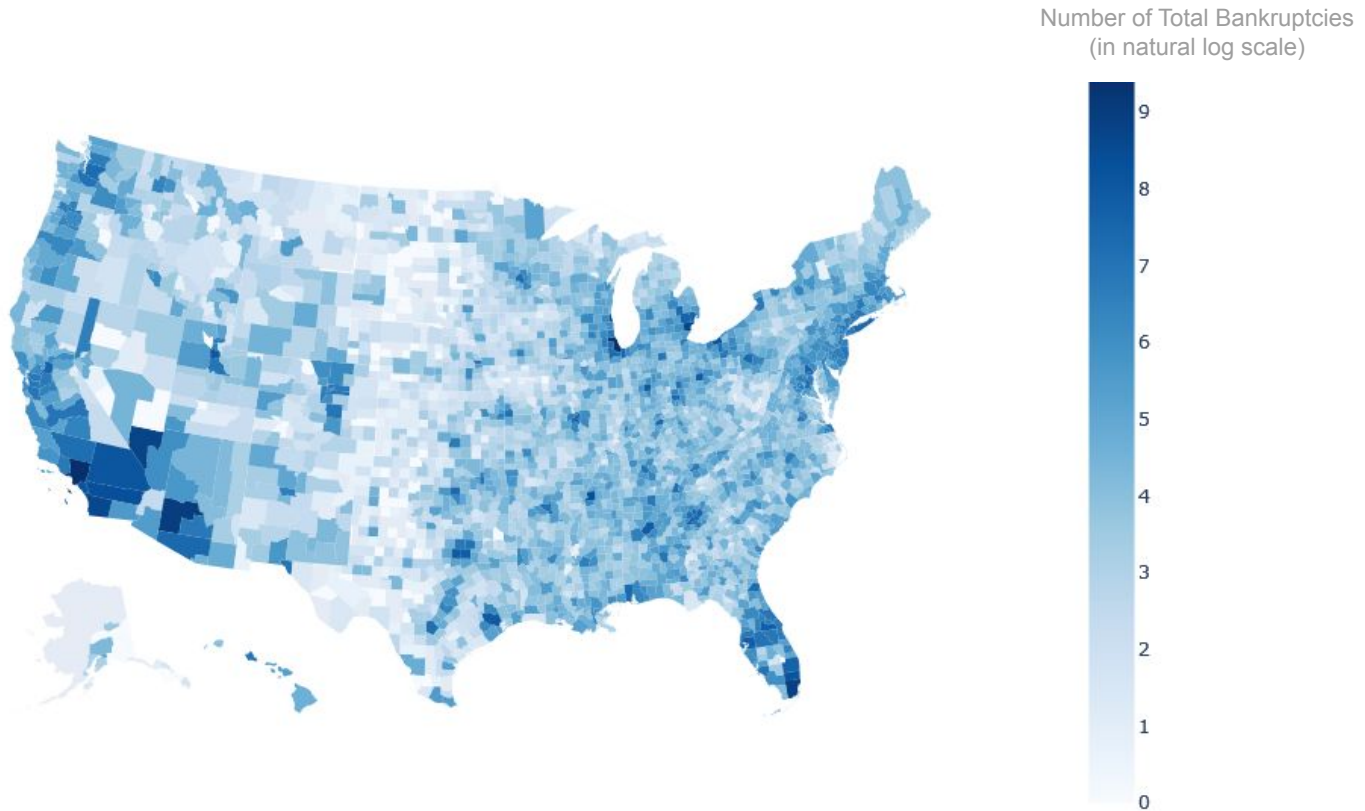
Granja, João, Makridis, Christos, Yannelis, Constantine and Zwic, Eric. 2021. *Did the Paycheck Protection Program Hit the Target?.*: University of Chicago Becker Friedman Institute Working Paper NO.2020-52.

James, Gareth, Witten, Daniela, Hastie, Trevor and Tibshirani, Robert. 2013. *An Introduction to Statistical Learning: with Applications in R.*: Springer.

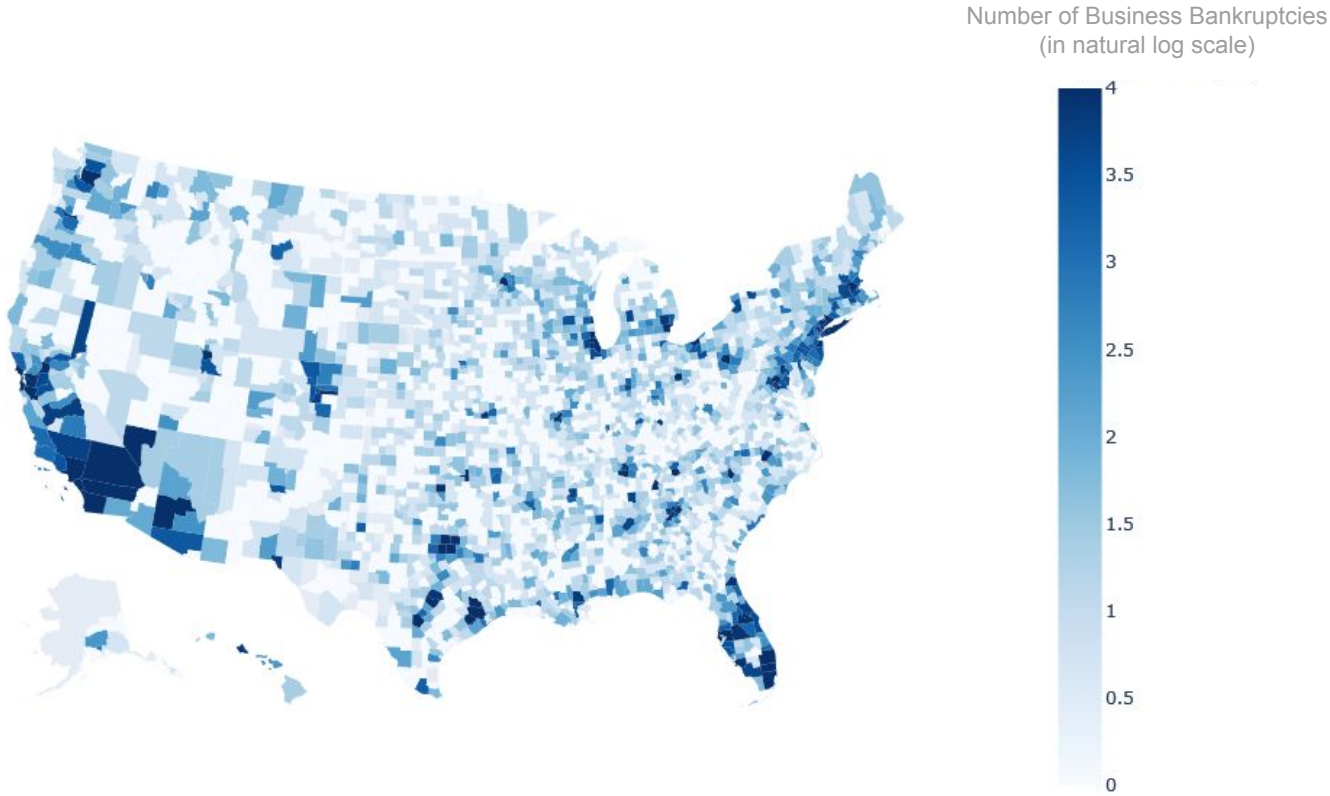


Appendix

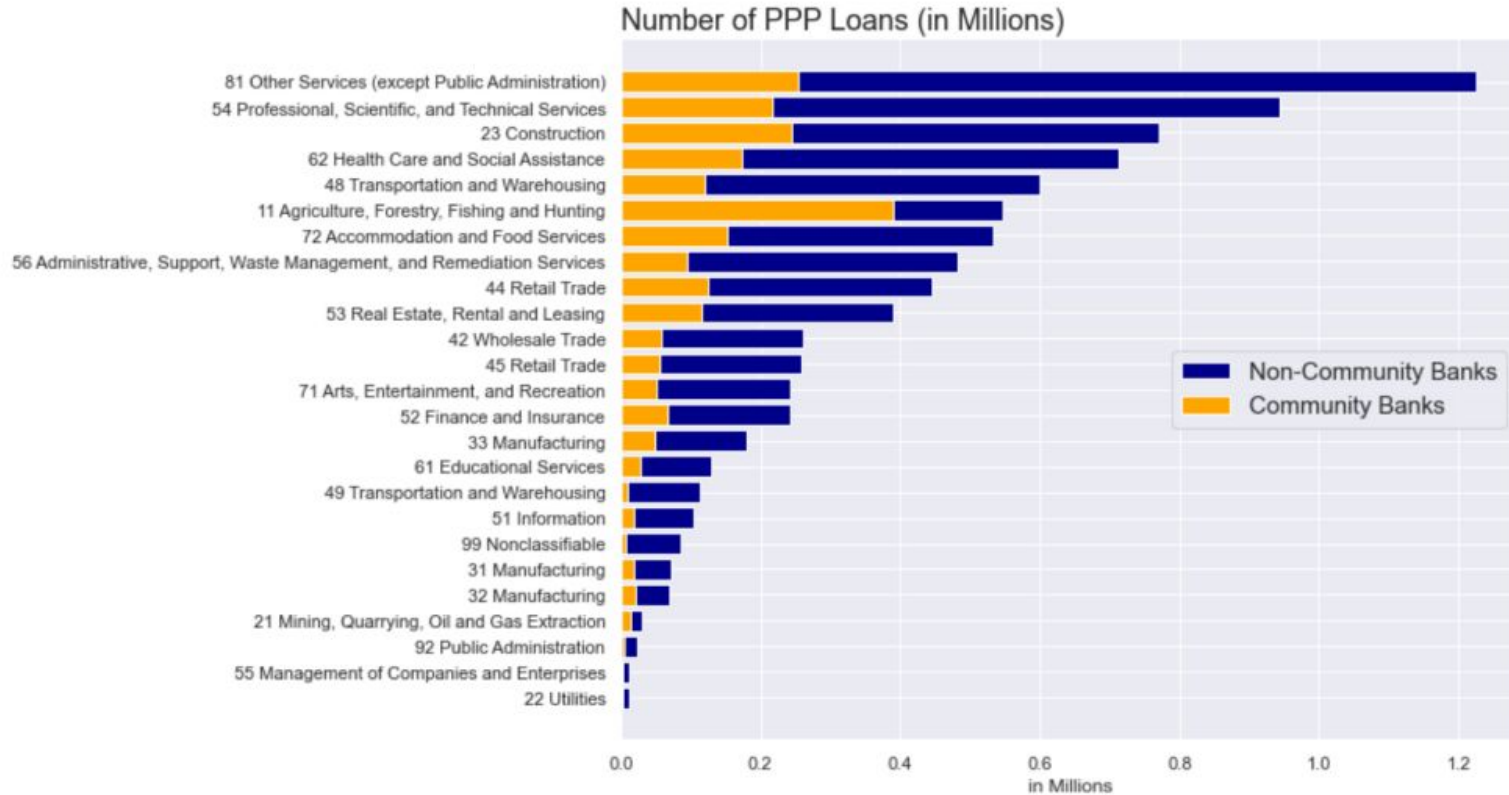
Number of Total Bankruptcies across Counties



Number of Business Bankruptcies across Counties (in natural log scale)



Number of PPP Loans across Industry Sectors



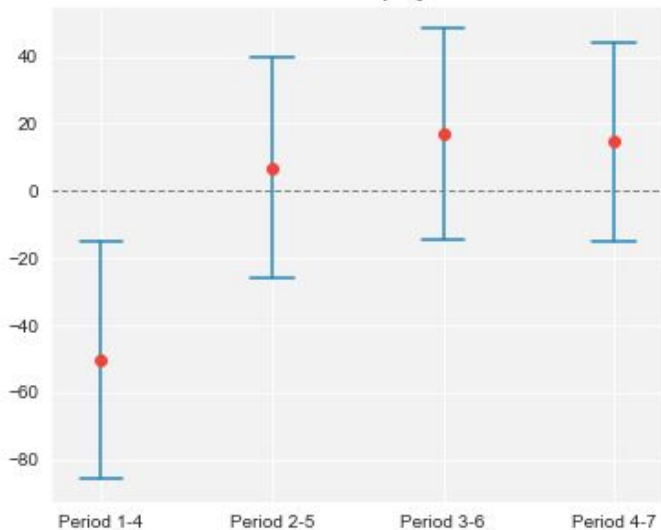
Regression 3: With State-Fixed Effects, Outcome Variable: Total Bankruptcy

	Bankruptcy in Period 1-4 (1)	Bankruptcy in Period 2-5 (2)	Bankruptcy in Period 3-6 (3)	Bankruptcy in Period 4-7 (4)
Percentage of loan by CB				
the number of loans in Periods 1-4	- 50.3868** (18.123)			
the number of loans in Periods 1-5		6.8664 (16.807)	16.8955 (16.028)	14.6335 (15.037)
the amount of loans in Periods 1-4	- 34.8371** (17.241)			
the amount of loans in Periods 1-5		3.4273 (15.973)	10.3059 (15.110)	9.1654 (14.210)
N	2984	2976	2971	2952

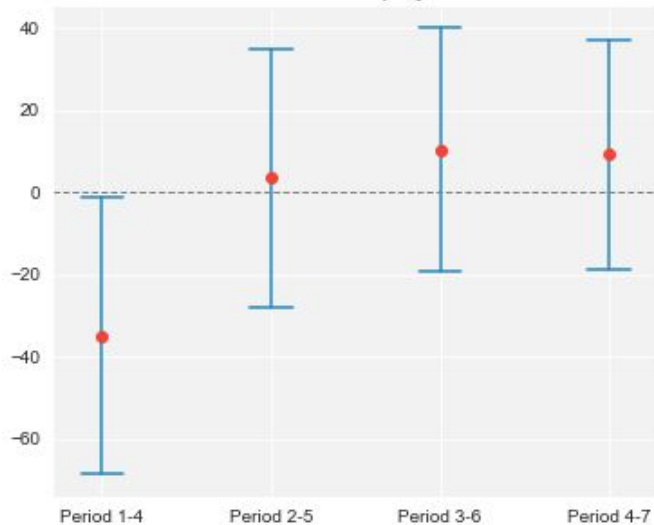
Regression 3: With State-Fixed Effects, Outcome Variable: Total Bankruptcy

95% Confidence Intervals of Coefficient Estimates

State-Fixed Effects: Total Bankruptcy - Number of PPP Loans



State-Fixed Effects: Total Bankruptcy - Amount of PPP Loans



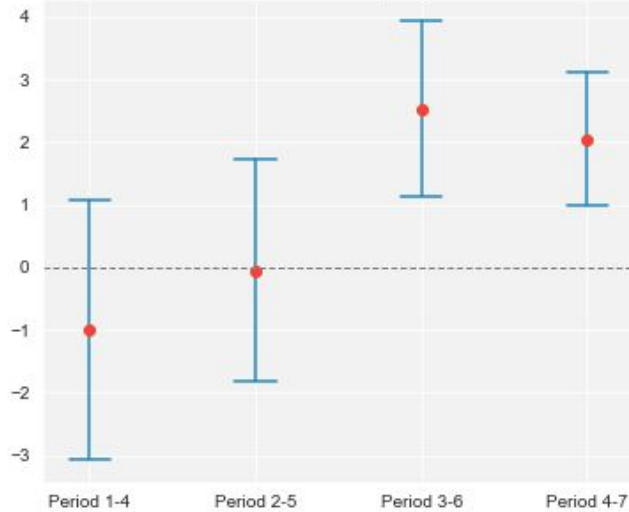
Regression 4: With State-Fixed Effects, Outcome Variable: **Total Business Bankruptcy**

	Bankruptcy in Period 1-4 (1)	Bankruptcy in Period 2-5 (2)	Bankruptcy in Period 3-6 (3)	Bankruptcy in Period 4-7 (4)
Percentage of loan by CB				
the number of loans in Periods 1-4	- 1.0098 (1.057)			
the number of loans in Periods 1-5		- 0.052 (0.903)	2.5289*** (0.712)	2.0478*** (0.539)
the amount of loans in Periods 1-4	- 0.3890 (1.005)			
the amount of loans in Periods 1-5		0.2277 (0.858)	2.0399*** (0.672)	1.7843*** (0.510)
N	2984	2976	2971	2952

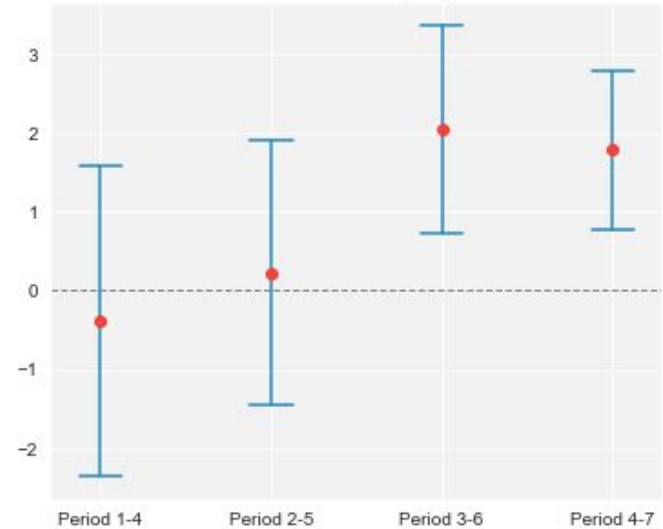
Regression 4: With State-Fixed Effects, Outcome Variable: [Total Business Bankruptcy](#)

95% Confidence Intervals of Coefficient Estimates

State-Fixed Effects: Business Bankruptcy - Number of PPP Loans



State-Fixed Effects: Business Bankruptcy - Amount of PPP Loans



SBA's COVID-19 Relief Programs

	Paycheck Protection Program Applicant	Shuttered Venue Operators Grant Applicant	COVID-19 EIDL Applicant	Restaurant Revitalization Fund Applicant
PPP recipient	First Draw PPP borrowers may be eligible to apply for Second Draw PPP loans	May apply for SVOG if received a PPP loan; if PPP loan received after Dec. 27, 2020, the PPP loan amount will be deducted from the SVOG. May not apply for PPP after receiving SVOG	May apply for EIDL and PPP, but cannot be used for the same purpose/costs	PPP loans received by the RRF applicant will affect the applicant's funding calculation
Shuttered Venue Operators Grant recipient	May not apply for PPP loan after receiving SVOG	May be eligible to receive a supplemental SVOG award	May apply for EIDL and SVOG, but cannot be used for the same purpose/costs	Entities that have a pending application for or received a Shuttered Venue Operators Grant are not eligible to apply for RRF
COVID-19 EIDL recipient	May apply for PPP, but cannot be used for the same purpose/costs as EIDL	May apply for SVOG, but cannot be used for the same purpose/costs as EIDL	May apply for one EIDL, then submit applications to increase funds from that same loan	May apply for EIDL and RRF
RRF recipient	PPP loans received by the RRF applicant will affect the applicant's funding calculation	Entities that have a pending application for or received an RRF are not eligible to apply for Shuttered Venue Operators Grants	May apply for EIDL and RRF	The same business cannot apply for RRF more than once