Community Banks' Impact in the Pandemic PPP Lending Program

CSBS 2022 Annual Data Analytics Competition

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Questions

- How can data analytics models use data from the Paycheck Protection Program (PPP) to illuminate the role of community banks during the COVID-19 crisis?

- Did PPP lending via community banks impact the economy differently than PPP lending via other lenders, particularly larger banks?

Main Findings

- **Community banks were the most effective PPP lenders**
  PPP lending through community banks decreased unemployment and raised payrolls more than PPP lending via non-community banks.

- **Reasons community bank lending was effective**
  1. PPP loans extended by community banks were forgiven at a much higher rate than PPP loans extended by banks which were larger and less tied to a locality.
  2. Community banks extended PPP loans quicker than non-community banks

Pandemic

- COVID-19 spread in the US in March 2020.
- Spread fast, wide in range, and high mortality.
- Stay at home => unemployment rate climbed from 4.4% to 14.7% from March 2020 to April 2020.

Paycheck Protection Program (PPP)

PPP Lending Program begins in April 2020

In response to the negative effect of COVID-19 on economic conditions, Paycheck Protection Program (PPP) is established by the CARES Act as a way of providing loans to support small business owners and offsetting revenue loss during business shutdowns.

On aggregate. 27.3 % of PPP via community banks. Remainder via larger banks.

Purpose of the PPP program is to reduce unemployment and maintain business payrolls.

What a business needed to do to have the full loan forgiven
      -The compensation levels are maintained
      -At least 60% of the proceeds are spent on payroll costs during the 8 to 24 weeks.

Literature review

Existing studies about the Paycheck Protection Program mainly explore its impact on:

1. The job market

2. Banking system

Data

1.PPP loan-level data

Source: Provided by CSBS

Loan-level Paycheck Protection Program (PPP) data with current approval amount and forgiveness amount

1.2020 and current unemployment data

Source: Bureau of Labor Statistics (BLS)

The average unemployment rate data we use from BLS merged with PPP loan-level data via the borrower county FIPS code

1.2019 and 2020 county-level data of County Business Patterns

Source: Census Bureau

The annual County business patterns (CBP) data that provides subnational economic data by industry

1.US county names and FIPS codes

Source: US Department of Agriculture (USDA)

We match the county and state names to the respective FIPS code using the table from the USDA

1.NAICS codes for industries

Source : Provided by CSBS

Two-digit NAICS codes related to their respective industries from the Census Bureau

Some difficulties during data collection

- County-level data on County Business Patterns for 2020 was not published until the end of April 2020 (i.e a week ago)

- BLS did not publish the yearly average unemployment rate for 2021. However, they published the data a week ago and we updated our data immediately.

- Missing PPP data definitions (ex. originatinglenderlocationid)

- "N/A" and blank value for some variables (ex. Borrower city)

Definitions of Key Variables

Definition 1: $$forgivenessrate = \frac{forgivenessamount}{currentapprovalamount}$$

Forgivenessamount = the total dollars forgiven
Currentapprovalamount = the total loan values

Definition 2: $$\Delta Unemployment = Unemployment_{2021} - Unemployment_{2020}$$

Unemployment = the year average unemployment rate with the subscript indicating the year

Definition 3: $$\Delta Payroll = \frac{annualpayroll - q1payroll}{3} - q1payroll$$

Annualpayroll = total payroll for a given year
Q1payroll = payroll for the first quarter of a given year

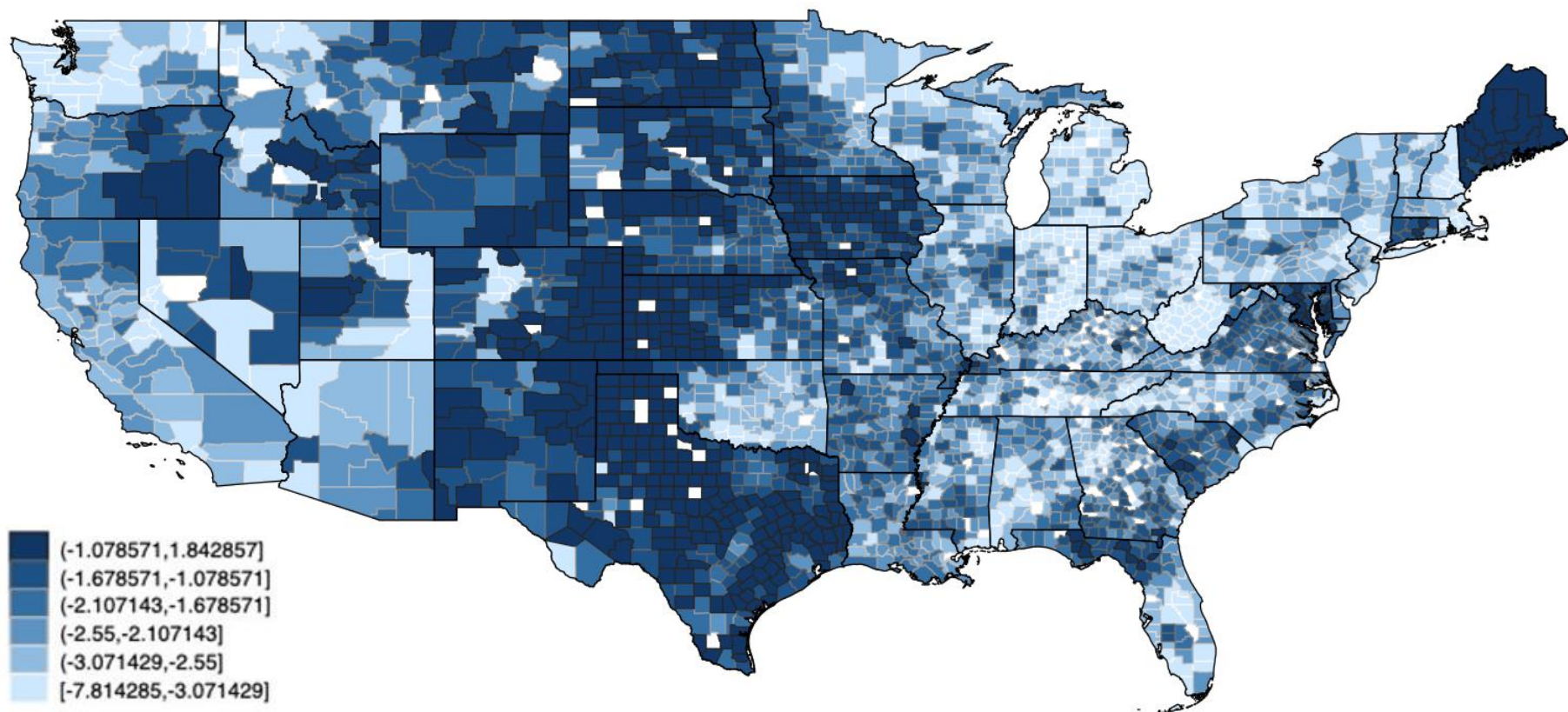Figure 1: Change in Unemployment Rate by County 2020-2021

Legend	
	(-1.078571,1.842857]
	(-1.678571,-1.078571]
	(-2.107143,-1.678571]
	(-2.55,-2.107143]
	(-3.071429,-2.55]
	[-7.814285,-3.071429]

Figure 3: Current Approval Amount for PPP Loans by Community Bank

(6.67e+07,2.63e+09]
(2.91e+07,6.67e+07]
(1.47e+07,2.91e+07]
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(2482450,6896426]
[1083,2482450]
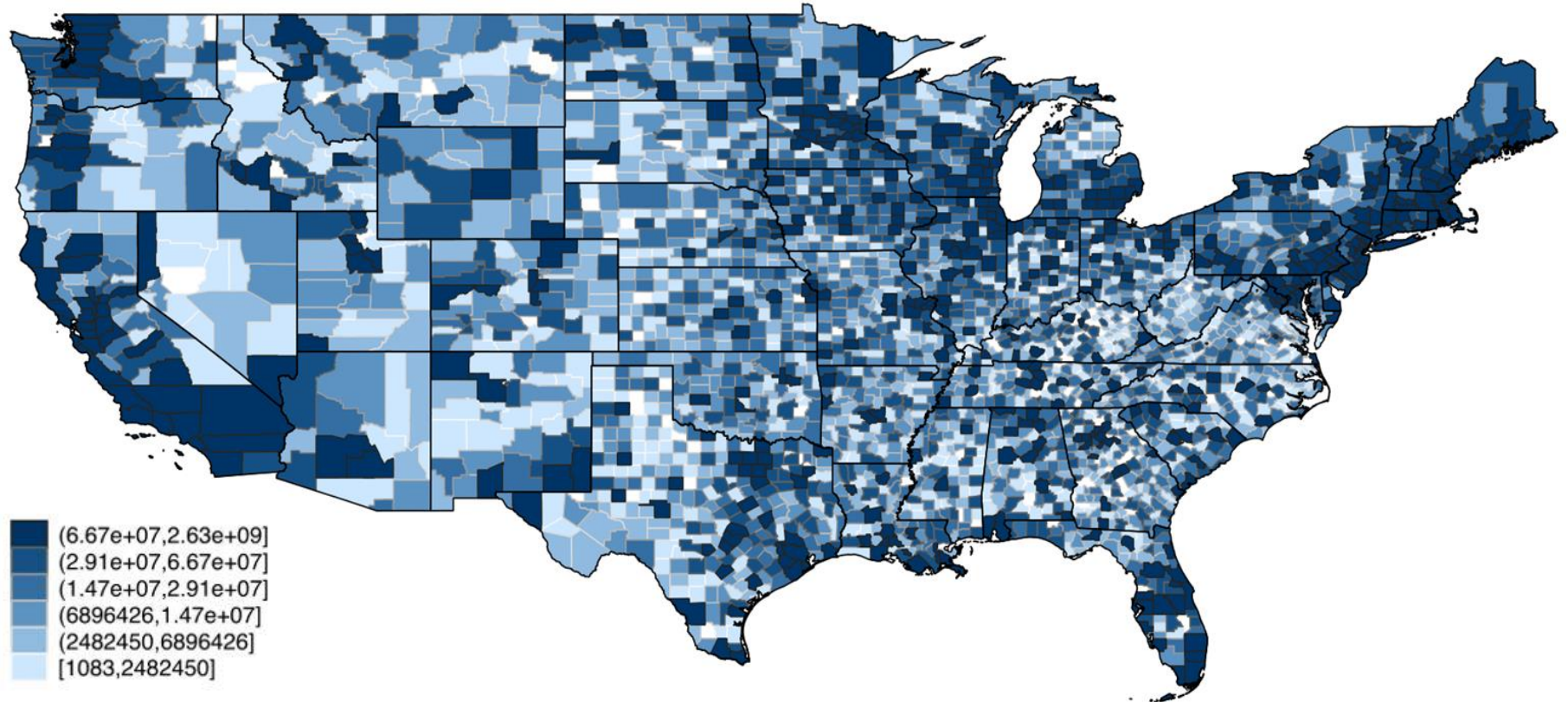
Figure 4: Current Approval Amount for PPP Loans by Non-community Bank

Legend:
- (9.80e+07,1.61e+10]
- (2.77e+07,9.80e+07]
- (1.06e+07,2.77e+07]
- (3820954,1.06e+07]
- (1016130,3820954]
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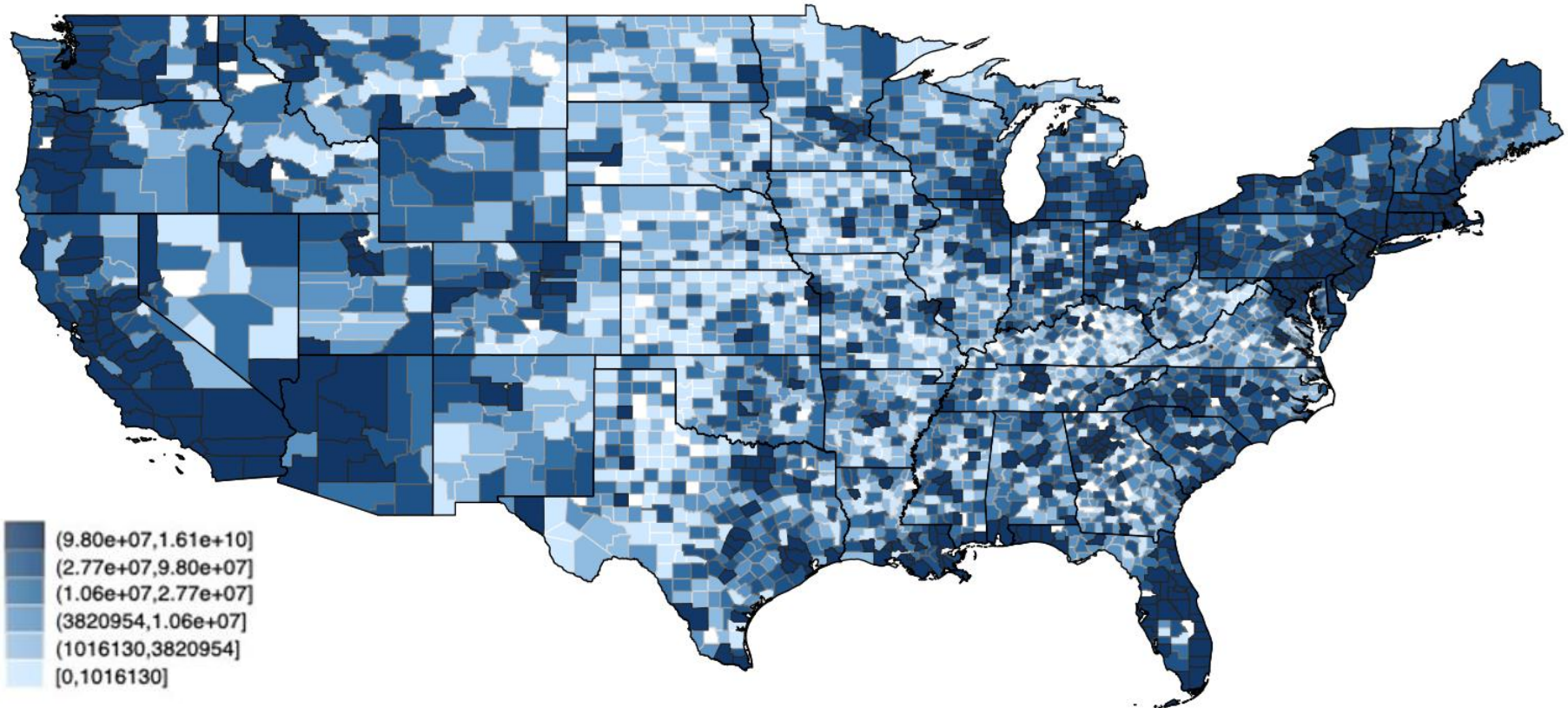
Linear Regression Models

$$Model\ 1: \ \Delta Unemplo\hat{y}ment = \beta_0 + \beta_1 * Lending + \epsilon$$

- Change in Unemployment from 2020 to 2021 regressed against Total Lending Amount

$$Model\ 2: \ \Delta Unemplo\hat{y}ment = \beta_0 + \beta_1 * CBLending + \epsilon$$

- Changes in Unemployment from 2020 to 2021 regressed against CB Lending Amount

$$Model\ 3: \ \Delta Unemplo\hat{y}ment = \beta_0 + \beta_1 * NCBLending + \epsilon$$

- Change in Unemployment from 2020 to 2021 regressed again NCB Lending Amount

$$Model\ 4: \ \Delta Unemplo\hat{y}ment = \beta_0 + \beta_1 * CBLending + \beta_2 * NCBLending + \epsilon$$

- Change in Unemployment from 2020 to 2021 regressed against CB Lending Amount and NCB Leading Amount.

Table 1A: Regression Results

Variables	All Loans (1)	Only CB (2)	Only Non-CB (3)	CB and Non-CB (4)
Total PPP Loans ($ bil)	-0.19935 *** (0.028)			
Community Bank PPP Loans ($ bil)		-0.98143*** (0.136)		-0.61270 * (0.259)
Non-Community Bank PPP Loans ($ bil)			-0.23560 *** (0.0335)	-0.10672 . (0.06402)

Notes: Standard error in parenthesis. Significance level indicated by *** - 0.001, ** - 0.01, * - 0.05, . - 0.1.

Linear Regression Models (Cont.)

$$Model\ 5:\ \Delta Payroll_{2020} = \beta_0 + \beta_1 * Lending + \beta_2 * CBLending + \sum_{i=3}^{x} \beta_i Control_i + \epsilon$$

- Change in Quarterly Payroll vs. All Lending and CB Lending with Controls

$$Model\ 6:\ \Delta Payroll_{2020} = \beta_0 + \beta_1 * CBLending + \beta_2 * NCBLending + \sum_{i=3}^{x} \beta_i Control_i + \epsilon$$

- Change in Quarterly Payroll vs. CB Lending and NCB Lending with Controls

$$Model\ 7:\ \Delta Payroll_{2020} = \beta_0 + \beta_1 * Lending + \beta_2 * ForgivenCBLending + \beta_3 * ForgivenNCBLending + \sum_{i=4}^{x} \beta_i Control_i + \epsilon$$

- Change in Quarterly Payroll vs. All Lending, Forgiven CB Lending, and Forgiven NCB Lending with Controls.

Table 1B: PPP Lending and Payrolls During 2020

PPP Lending	DV: Change Payroll	DV: Change Payroll
All Banks	-.8794***	
	(.03906)	
Community Banks	1.646***	0.7668***
	(0.1497)	(0.1229)
Non Community Banks		-0.8794***
		(0.03906)
R-squared	.029	0.29

Controls for all regressions: County population, COVID-19 Hospitalizations, COVID-19 Cases.
*** p<0.01, ** p<0.05, * p<0.1. 3,024 observations for all regressions.

Table 1C: PPP Lending and Payrolls During 2020

PPP Lending	DV: Change Payroll
All Banks	-1.927***
	(9.955e+07)
Forgiven Loans: Community Banks	2.587***
	(0.177)
Forgiven Loans: Non Community Banks	2.206***
	(0.187)

Controls for all regressions: County population, COVID-19 Hospitalizations, COVID-19 Cases.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$. 3,024 observations for all regressions. $R2=0.32$

Table 2: Percentage of Loans Forgiven by Bank Type

Bank Type	# All Loans (mil)	Forgiven By Number			Total Value ($ mil)	Forgiven Value ($ mil)	Forgiven By Value
		# Forgiven (mil)	Percent				Percent
Community	2.3	1.4	61.5%		561,155	126,992	77.3%
Non-Community	6.1	2.4	38.8%		396,902	242,730	61.2%
All	8.4	3.8	45%		164,253	369,722	65.9%

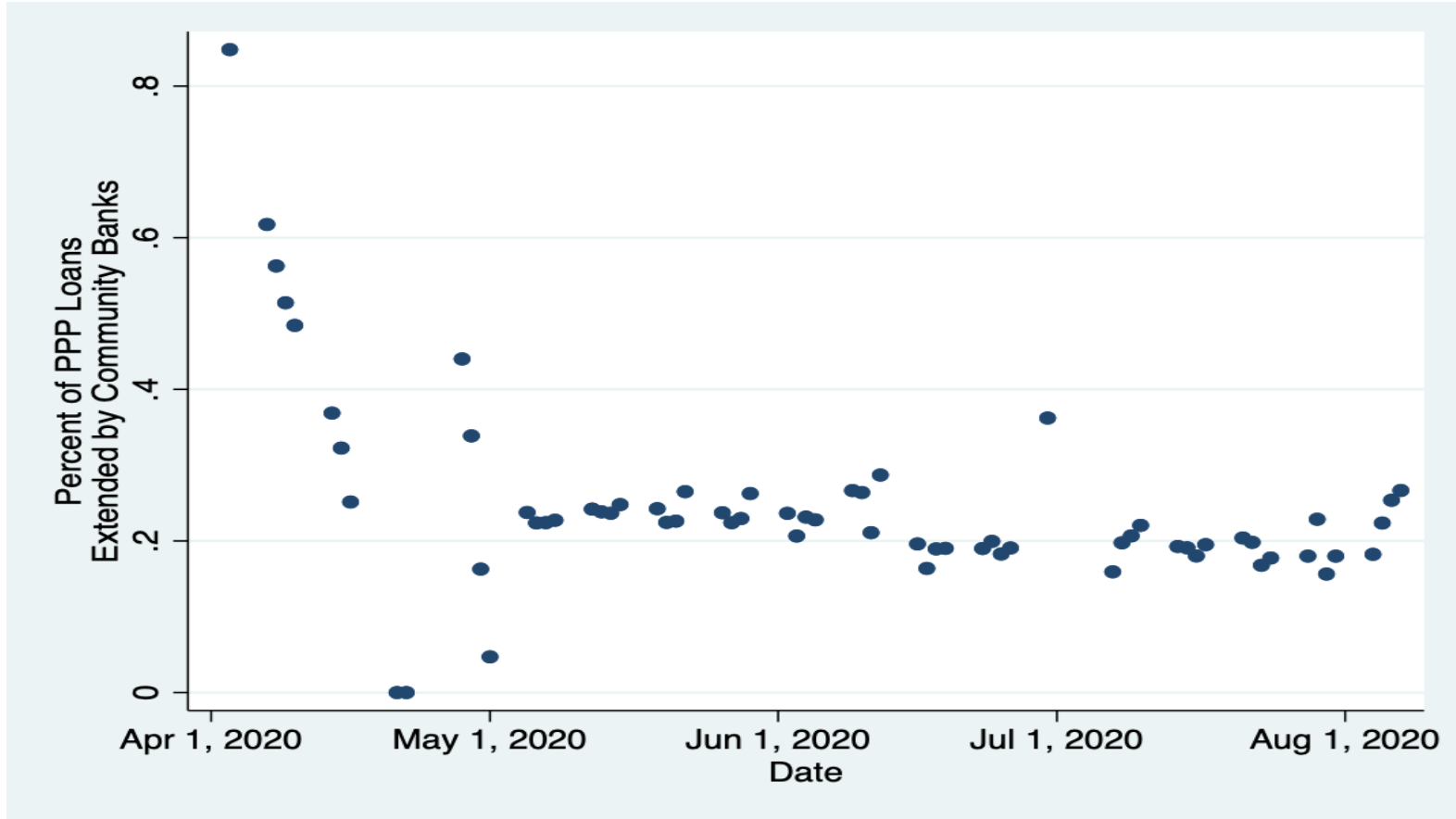# Figure 9: Percent of PPP Loans Extended by Community Banks in 2020
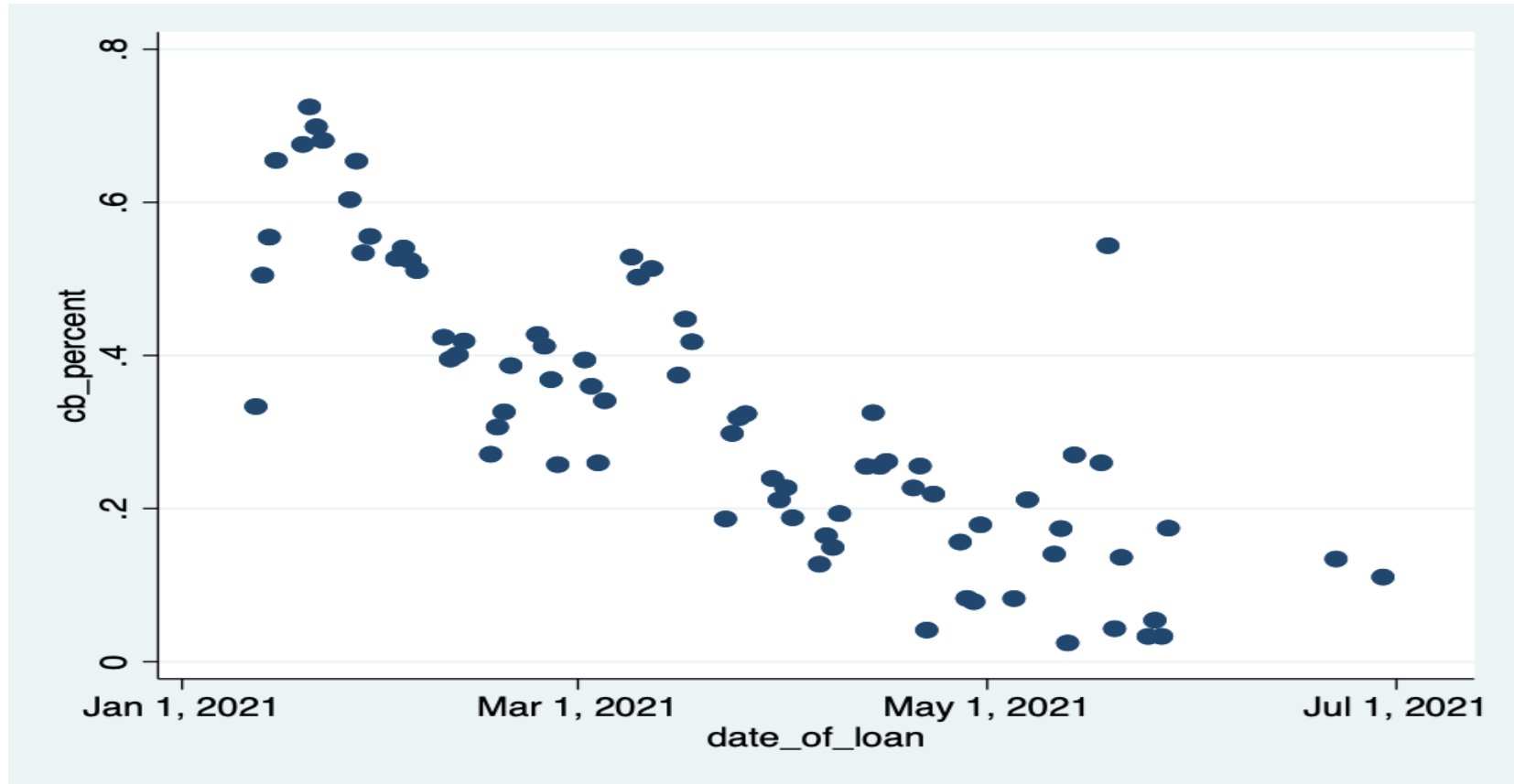
Figure 10: Percent of PPP Loans Extended by Community Banks in 2021

Conclusion

1) PPP lending via community banks appears to have reduced unemployment in a county during the COVID pandemic more than PPP lending via other institutions, particularly larger banks
   a) $1 billion in PPP lending via community banks reduced unemployment by about 0.6%
   b) $1 billion in PPP lending via other institutions reduced unemployment by about 0.1%

1) Community banks appear to have been more effective PPP lenders because
   a) They extended loans quicker than other lending institutions
   b) The loans that they extended were used by businesses more often to pay employees and other costs of business in their local communities
   c) We are not sure why community banks did such a good job and wondering your ideas

1) Recommendations
   a) Similar programs in the future might direct more funds via community banks because they produce better outcomes at lower costs
   b) Research needed to determine source of community banks' effectiveness. This information might be used to structure future government programs to ensure all lending is as effective as possible

Thanks!

Appendix

Table 3: Loans Distributed by Industry and Bank Type

NAICS Code	Industry Title	# Businesses (mil)	# CB Loans (10k)	# NCB Loans (10k)	# All Loans (10k)	CB Loan Value ($ bil)	NCB Loan Value ($ bil)	All Loan Value ($ bil)	% cb Loans (Count)	% cb Loans (Value)
23	Construction	1.51	24.75	50.53	75.28	23.36	44.05	67.41	32.9	34.7
11	Agriculture, Forestry, Fishing and Hunting	3.68	39.25	14.83	54.08	7.66	5.96	13.62	72.6	56.2
72	Accommodation and Food Services	9.00	15.17	37.00	52.17	14.48	29.56	44.03	29.1	32.9
21	Mining	.032	1.43	1.51	2.94	1.94	2.71	4.65	48.5	41.8
42	Wholesale Trade	.70	5.68	1.97	25.42	6.81	20.93	27.73	22.4	24.5
54	Professional, Scientific, and Technical Services	2.41	21.43	69.05	90.48	17.64	50.69	68.32	23.7	25.8
81	Other Services (except Public Administration)	1.92	25.85	97.02	122.87	10.63	31.21	41.84	21	25.4
52	Finance and Insurance	.77	6.74	16.41	23.15	3.88	8.59	12.47	29.1	31.1
92	Public Administration	.26	.59	1.65	2.24	0.62	1.25	1.88	26.4	33.2
62	Health Care and Social Assistance	1.70	17.30	51.26	68.54	21.72	48.17	69.88	25.2	31.1

Table 3: Loans Distributed by Industry and Bank Type

56	Administrative and Support and Waste Management and Remediation Services	1.65	9.71	37.89	47.60	7.07	21.96	29.03	20.4	24.3
61	Educational Services	.43	2.66	9.78	12.43	3.54	8.78	12.32	21.4	28.8
53	Real Estate Rental and Leasing	.89	11.57	25.96	37.53	5.04	11.68	16.72	30.8	30.1
71	Arts, Entertainment, and Recreation	.38	5.04	18.85	23.89	2.50	7.21	9.71	21.1	25.8
51	Information	.37	1.97	8.08	10.06	2.12	7.55	9.67	19.6	21.9
22	Utilities	.05	.34	.71	1.05	0.55	0.88	1.43	32.2	38.7
55	Management of Companies and Enterprises	.08	.21	.95	1.16	0.37	1.15	1.51	17.9	24.2

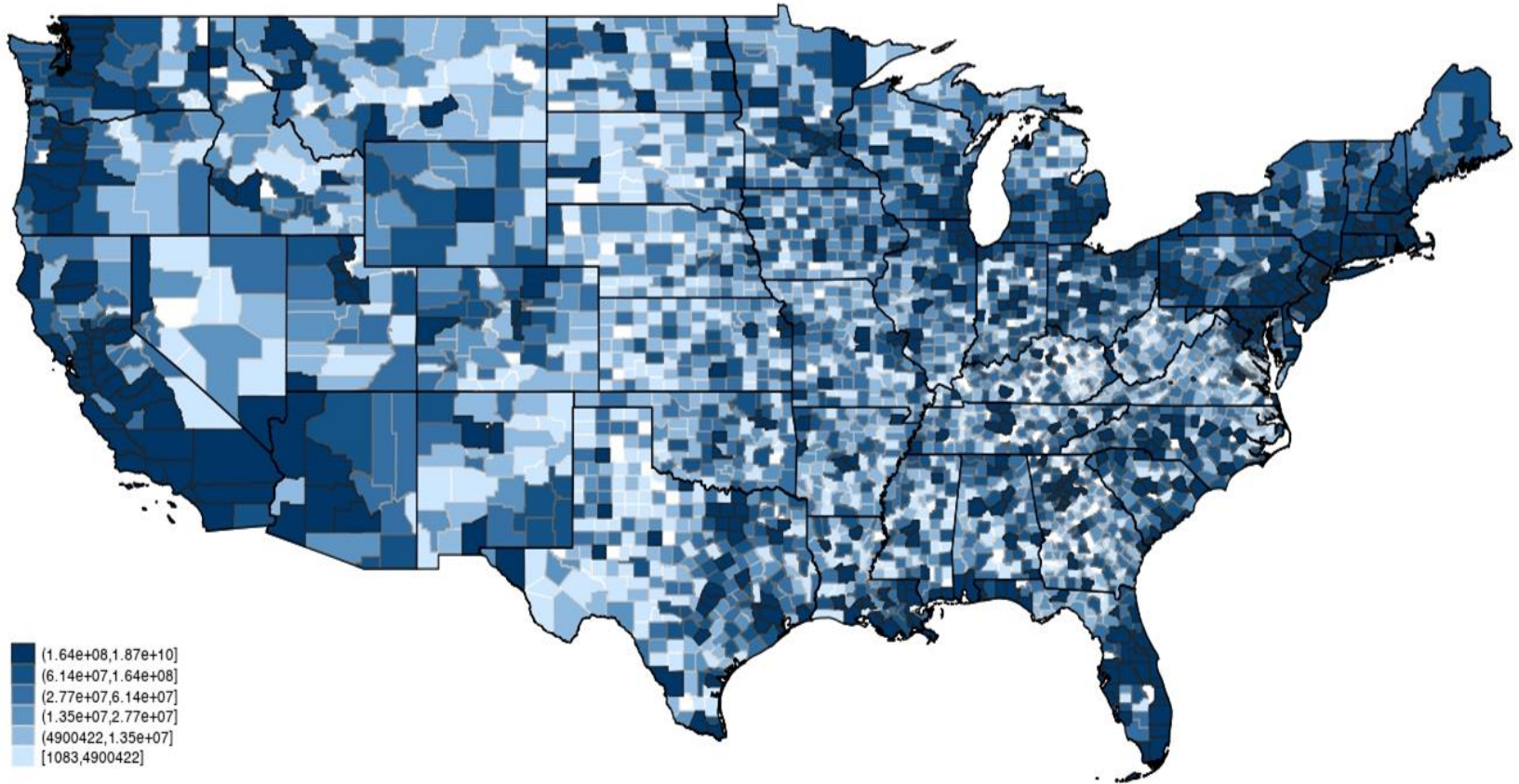# Figure 2: Current Approval Amount for Total PPP Loans

■	(1.64e+08,1.87e+10]
■	(6.14e+07,1.64e+08]
■	(2.77e+07,6.14e+07]
■	(1.35e+07,2.77e+07]
■	(4900422,1.35e+07]
□	[1083,4900422]

Figure 5: Forgiveness Rate for Total PPP loans

Legend:
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- (.5980296,.672525]
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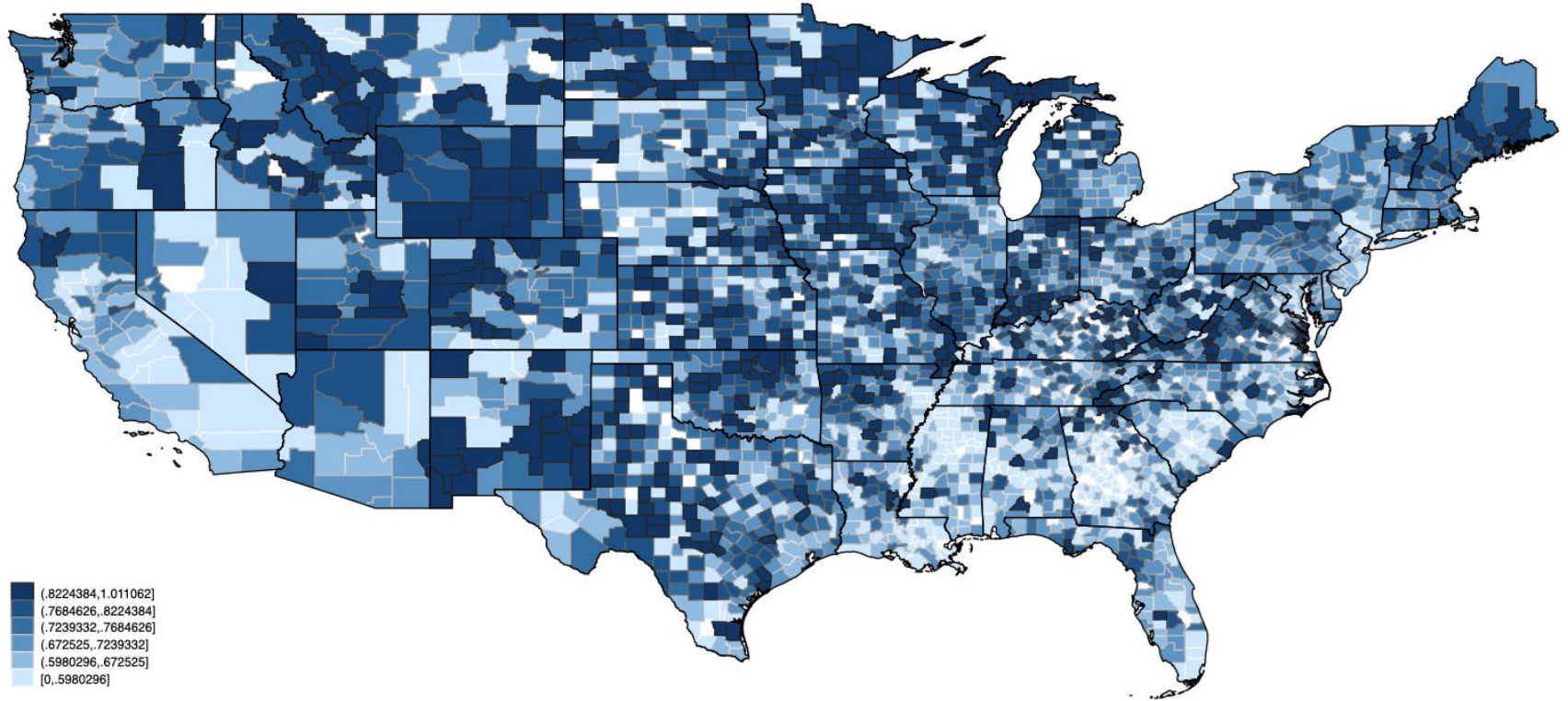
Figure 6: Forgiveness Rate for PPP loans by Community Bank

Legend:
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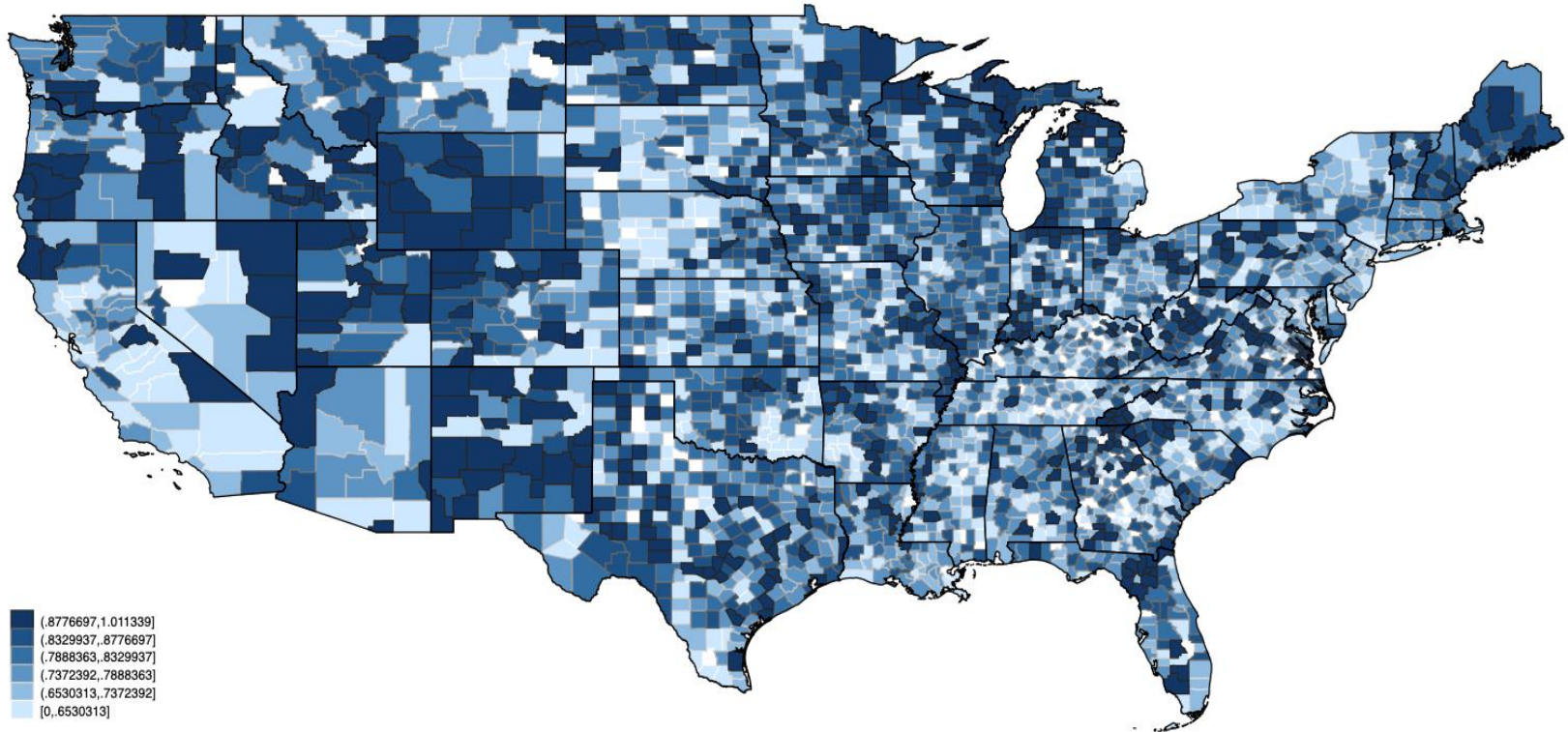
Figure 7: Forgiveness Rate for PPP loans by Non-community Bank

Legend:
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- (.4280403,.565155]
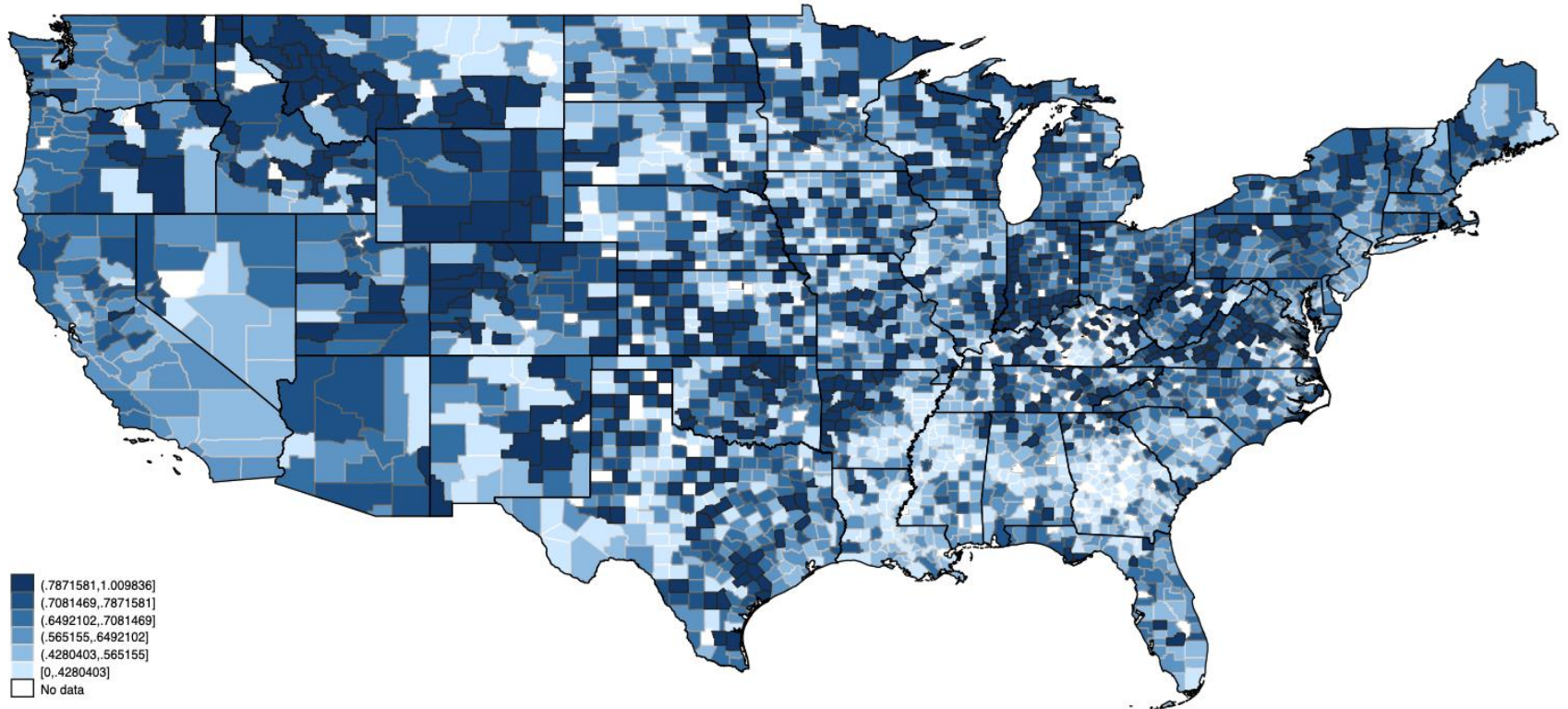- [0,.4280403]
- No data

Figure 8: Counts for PPP Loans Made by All Banks and PPP Loans by Community Banks
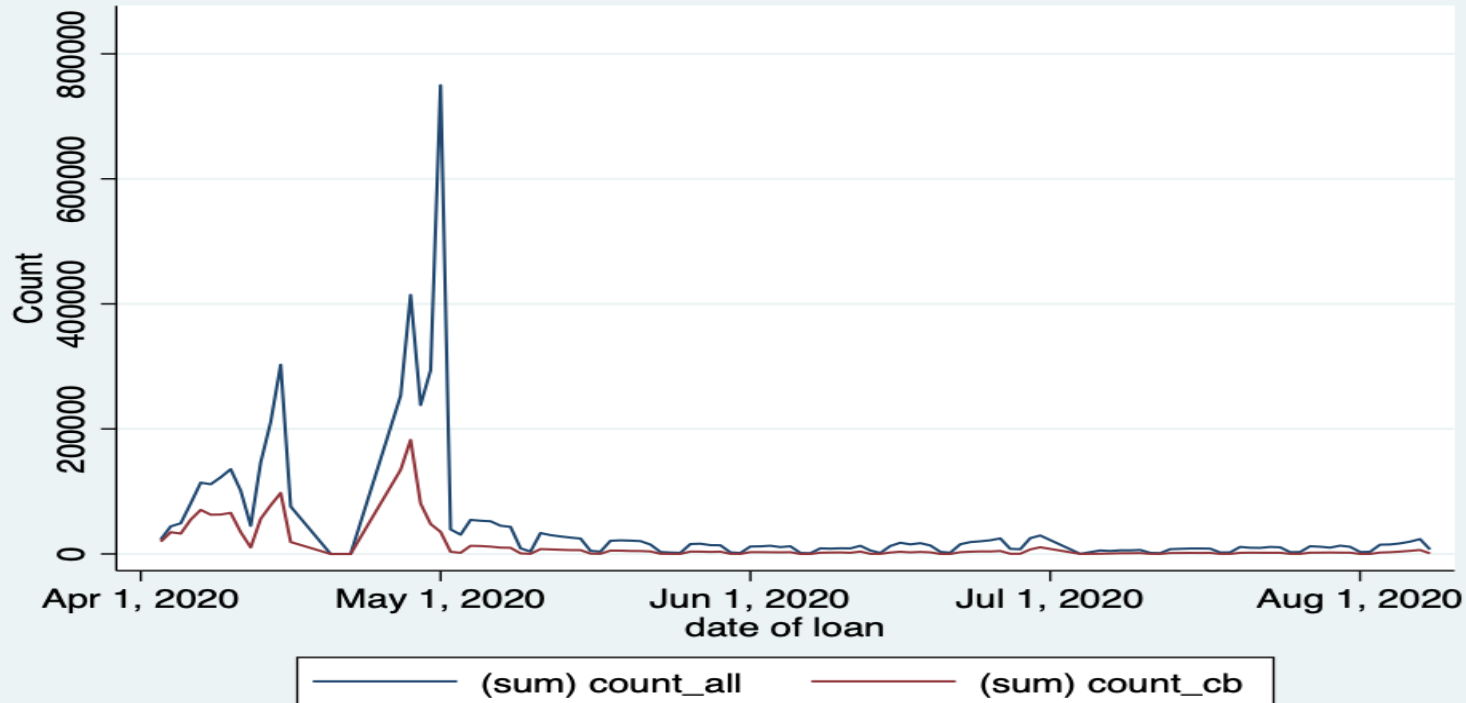
Table 1B: Regression Results

Variables	w/o 2019 Payroll Change (5)	w/ 2019 Payroll Change (6)
Community Bank PPP Loans ($ bil)	0.839045 *** (0.123283)	0.053953 ** (0.019183)
Non-Community Bank PPP Loans ($ bil)	-0.705607 *** (0.030419)	-0.176219 *** (0.004936)

Notes: Standard error in parenthesis. Significance level indicated by *** - 0.001, ** - 0.01, * - 0.05, . - 0.1.