An Evaluation of the Paycheck Protection Program Using Administrative Payroll Microdata

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Introduction

Paycheck Protection Program (PPP)

- Established through Coronavirus Aid, Relief, and Economic Security (CARES) Act on March 27th
  - ▶ Expanded through Paycheck Protection Program and Health Care Enhancement Act on April 24th

- Authorized Small Business Administration (SBA) to approve $669 billion in guaranteed loans
  - ▶ First tranche from April 3rd to April 16th
  - ▶ Second tranche from April 27th to June 30th

- Important to evaluate efficacy of this fiscal stimulus program
  - ▶ Did it sustain employment and preserve businesses – or was it mostly a transfer to businesses that would have maintained employment regardless?
  - ▶ Analysis constrained by lack of high-frequency, large-sample employment database

Overview of Analysis

- Provide an early assessment of efficacy of PPP

  ▶ Leverage a linked employer-employee panel of weekly administrative payroll records from ADP

  ▶ Compare firms above and below industry-specific size thresholds for PPP eligibility via difference-in-difference event study framework

  ▶ Future work will match SBA data on PPP loan recipients to ADP records

- Unique strengths of ADP data for this analysis

  1. ADP processes payroll for about 26 million U.S. workers each month, about 20% of total U.S. private employment

  2. Sample size orders of magnitudes larger than most household surveys

  3. Available at weekly frequencies

  4. Data are representative of the U.S. workforce along many labor market dimensions (Canjner et al. 2018, 2020; Grigsby et al. 2019)

Recent Related Work

- Chetty, Friedman, Hendren, Stepner, and Opportunity Insights Team (2020)
  - ▶ Adopt similar empirical approach to our paper
  - ▶ Conclude that PPP "had little impact on employment at small businesses"
  - ▶ Primary data source is a **Earnin**, a financial management app

- Granja, Makridis, Yannelis, and Zwick (2020)
  - ▶ Leverage regional differences in PPP participation by financial institutions
  - ▶ Do not find substantial effect on economic outcomes of local geographic areas

- Bartik, Bertrand, Lin, Rothstein, and Unrath (2020)
  - ▶ Exploit state-level variation in receipt of PPP loans
  - ▶ Provide evidence that states with higher PPP loan approvals experienced smaller declines in employment and faster rates of rehiring

Paycheck Protection Program

Paycheck Protection Program: Enacted March 24, 2020

Dispersed $517 Billion btwn late March and late July, 2020

- Eligibility for PPP determined by firm size
  - max$\{500, c_{SBA}\}$ where c_{SBA} varies by industry according to SBA
  - Includes sole proprietors, independent contractors, and self-employed
  - Flexibility in how firms calculate their previous employment levels prior to COVID-19 pandemic

- Designed to encourage small businesses to maintain employment and wages at pre-crisis levels
  - Loan size limited to 10 weeks of payroll costs up to $10 million
  - Most PPP loans have run out by now

- Loans can be forgiven if four criteria are met over subsequent 24 weeks:
  1. Payroll expenses $\geq$ 60 percent amount of loan
  2. Qualifying expenses (including rent and utilities) $\geq$ amount of loan
  3. Return total employment to at least pre-crisis levels
 4. Maintain wages of each employee $\geq$ 75 percent of pre-crisis rates

Payroll of Eligible Firms: $521B v $517B Spent!

Source: Statistics of U.S. Businesses, Firms With Fewer Than 500 Employees, 2017

	Firms	Employment	2½ Months Payroll ($ Thous)
Total Private Sector	**5,976,761**	**60,556,081**	**521,449,419**
Agriculture, Forestry & Fishing	22,535	136,591	1,124,746
Mining & Oil & Gas Extraction	18,720	244,367	3,707,711
Construction	700,393	5,373,702	59,522,179
Manufacturing	244,098	5,039,772	47,835,647
Trade, Transportation & Utilities	1,129,034	10,736,588	91,535,076
Information	78,430	984,379	14,433,836
Financial Activities	544,763	3,361,539	45,126,926
Professional & Business	1,170,857	9,368,738	108,232,178
Education & Health	742,837	10,630,121	81,539,312
Leisure & Hospitality	666,730	9,971,192	40,272,986
Other Services	695,268	4,697,878	28,058,288

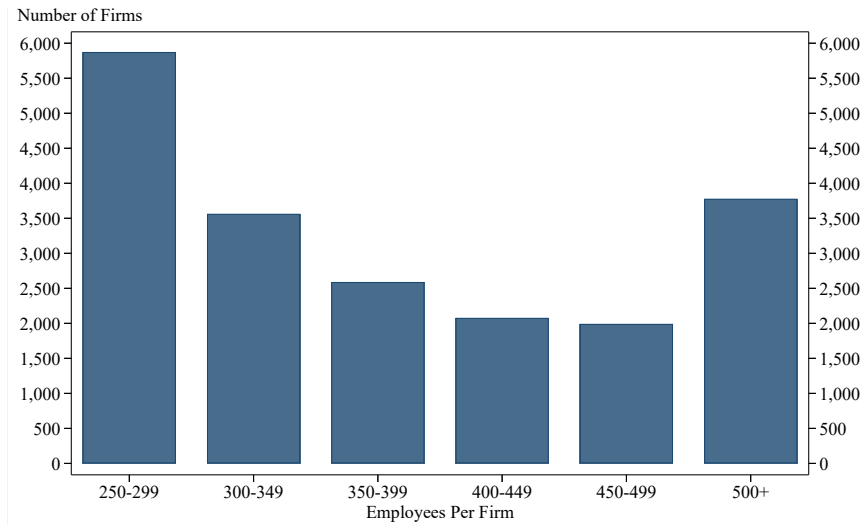Source: Census Bureau, *Statistics of U.S. Businesses*.

PPP Loans by Firm Size, 1-499: Most Loans to Small Firms; Most Affected Workers at Mid-Size Firms
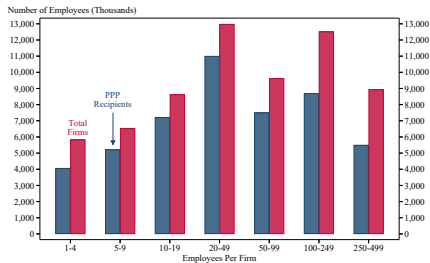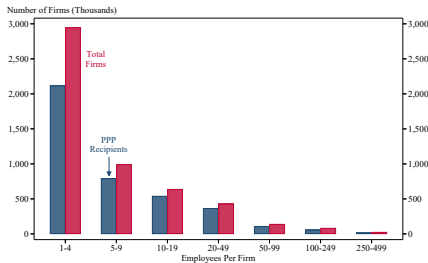
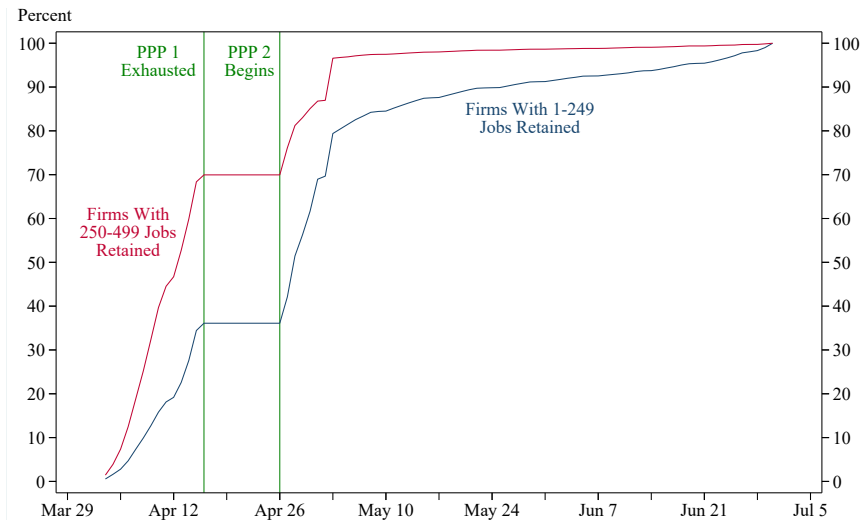- These data are the basis for the Treasury Department's conclusion that "51 Million Jobs Supported" by PPP

Approx 3,700 Firms with 500+ Workers Received Loans
Distribution of PPP Loans by Firm Size, 250+

Larger Firms Got PPP Loans Much Faster

Cumulative Distribution of PPP Loan Approvals by Date

Percent

PPP 1
Exhausted

PPP 2
Begins

Firms With
250-499 Jobs
Retained

Firms With 1-249
Jobs Retained

Mar 29   Apr 12   Apr 26   May 10   May 24   Jun 7   Jun 21   Jul 5

Empirical Strategy and Main Estimates

Difference-in-Difference Event Study

$$y_{i,t} = \alpha + \lambda PPP_i + \theta_{j,t} + \theta_{s,t} + \sum_{t \in T} \beta_t (PPP_i \times \theta_t) + \varepsilon_{i,t}$$

- where:
  - ▶ $y_{i,t}$ = labor market outcome at firm i indexed to February 2020 level
  - ▶ PPP_i = indicator for PPP eligibility of firm i
  - ▶ $\theta_{j,t}$ = industry j–by–week t effect
  - ▶ $\theta_{s,t}$ = state s–by–week t effect
  - ▶ θ_t = overall time effect for each week t
  - ▶ $T = \{2/2, \ 2/9, \ 2/16, \ ...\}$

Comparing Firms Slightly Above vs. Below Threshold
Summary Statistics as of February 2020

	PPP Threshold ±250		PPP Threshold ±100	
	0-249 Below	1-250 Above	0-99 Below	1-100 Above
Employment	389.8	653.4	472.9	579.1
% Female	46.2	46.4	46.1	48.5
% Hourly	62.5	64.1	63.0	63.0
Weekly Hours Per Worker	36.8	37.4	37.3	37.2
Weekly Earnings Per Worker ($)	1,271.8	1,277.3	1,278.6	1,278.8
Hourly Wage Per Worker ($)	37.8	36.9	37.7	37.5
Sectors (%):				
Manufacturing	7.8	9.0	8.7	8.2
Wholesale Trade	8.2	9.0	8.1	10.4
Retail Trade	6.4	8.1	6.2	8.4
Financial Activities	9.1	9.1	9.3	8.0
Professional & Business	17.4	17.0	17.2	15.9
Education & Health	18.9	17.9	20.2	18.3
Leisure & Hospitality	6.6	6.9	6.4	6.7
Other	25.7	22.9	24.0	24.2

Note: Employment, weekly hours, weekly earnings, and hourly wage represent firm-level means for each column. Data are weighted by each firm's employment as of February 2020. Samples reflect firms that were present in the ADP data for all 12 months of 2019.
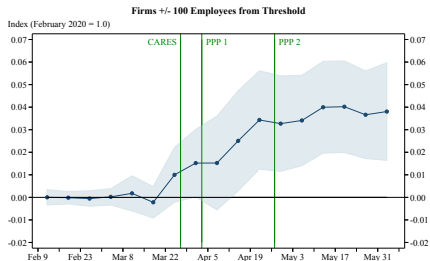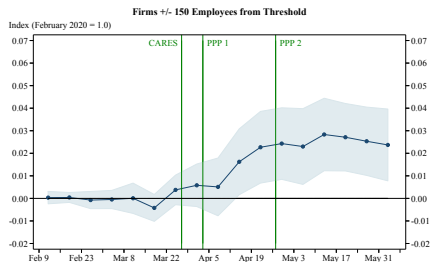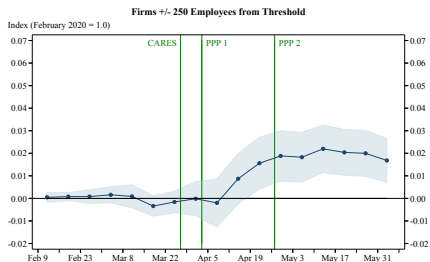Source: Authors' analysis of ADP data.

First Cut of the Data: Employment by Firm Size

Sample Includes Firms with PPP Eligibility at 500 Workers
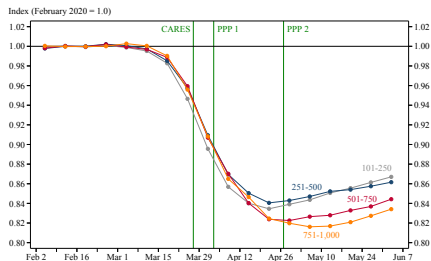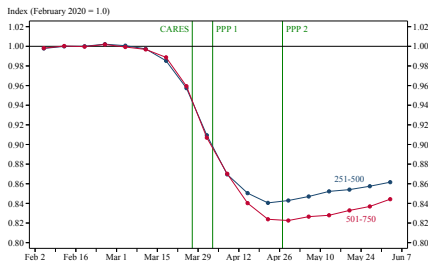
Main Estimates: Effect of PPP Eligibility on Employment

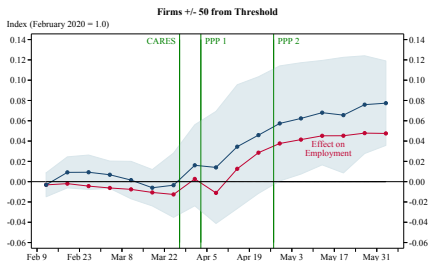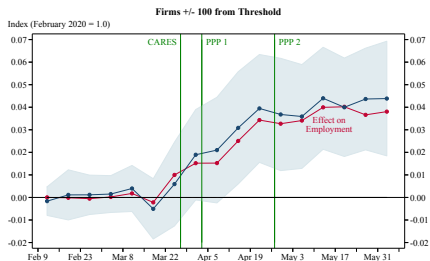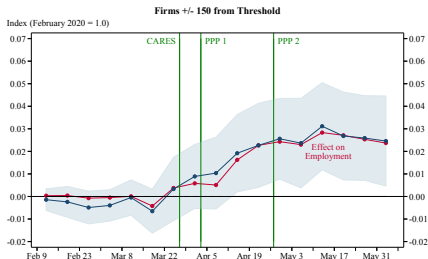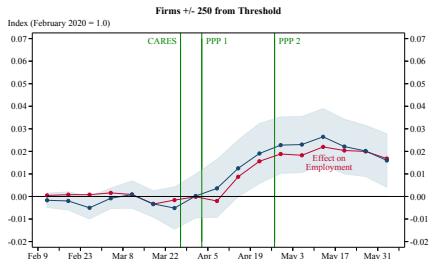State-Industry-Week   2019 Size   2020 Size
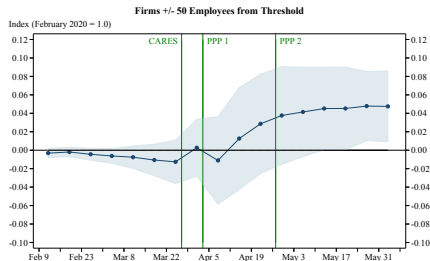
Four Small Extensions

1. Hours vs. employment

2. Earnings vs. employment

3. Placebo test

4. Upper bound: Comparing **for-sure** recipients PPP to other firms
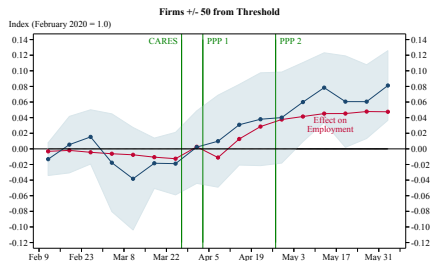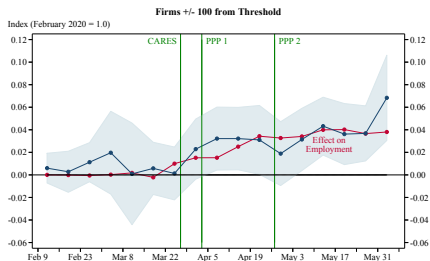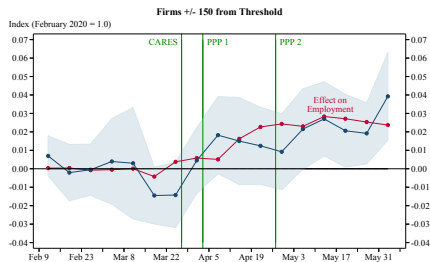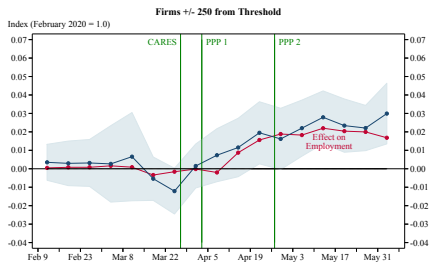
Hours Effect > Emp Effect: Higher-Hours Jobs Saved
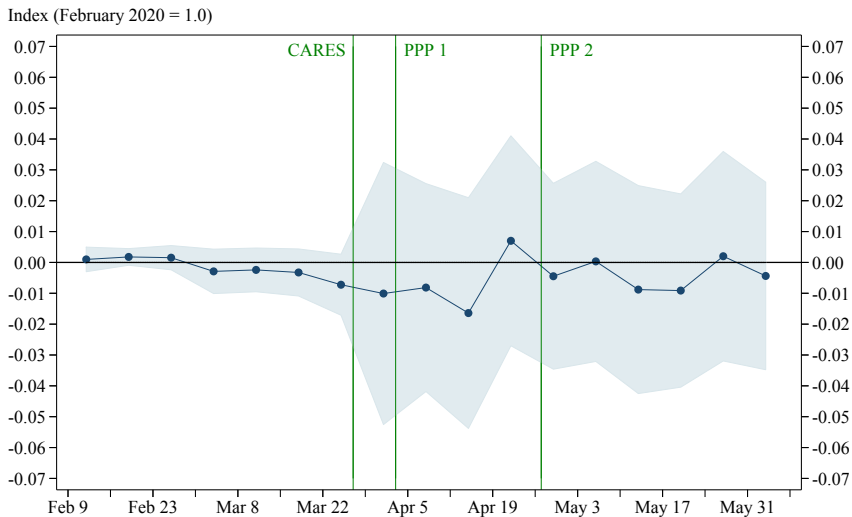## Effect of PPP Eligibility on Total Hours

Wagebill Effect > Emp Effect: Higher-Pay Jobs Saved
Effect of PPP Eligibility on Total Wage Bill
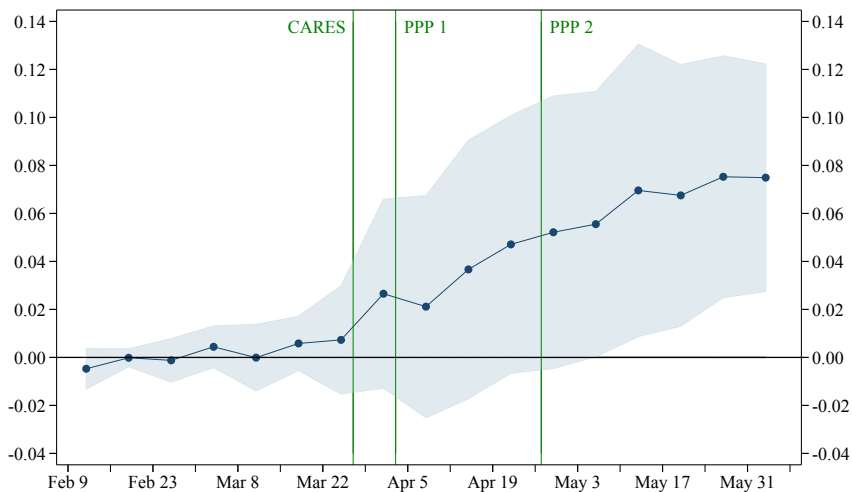
Placebo Effect for Firms With PPP Eligibility Above 500

We Would Expect to Find **No Effect** Here – And We Find None

Index (February 2020 = 1.0)

Employment at Firms that **Definitely** Recv'd PPP Loan

PPP Loan Receipt Determined from 8-K Filings: This Likely **Overstates** the Causal Effect

Index (February 2020 = 1.0)

Assessing Aggregate Effects

Estimation of Aggregate Effects

$$\text{Total Payroll Effect}_t = \underbrace{\delta_t \times \gamma}_{\beta_t} \times N$$

where:

- β_t = intent-to-treat estimate for week t
- δ_t = treatment-on-the-treated estimate for week t
- γ = take-up rate of PPP
- N = number of employees at PPP eligible firms

Preliminary Assessment of PPP

- Estimate that PPP increased aggregate employment by 2.31 million jobs

  ▶ $\beta_t \in [2\%, 4.5\%]$

  ▶ Preferred estimate of β_t is 3.25 percent

  ▶ Roughly 70 million workers at PPP eligible firms as of 2020

  ▶ Aggregate effects from 1.36 million to 3.20 million workers using range of β_t, with preferred estimate of 2.31 million

- Gut check: Is that number plausible?

  ▶ Recall that **treatment** effect of PPP on recipient firms is $\delta_t = \beta_t/\gamma$

  ▶ $\beta_t \in [2\%, 4.5\%]$

  ▶ $\gamma \in [62\%, 72\%]$ according to SBA and Census Bureau data

  ▶ Implies that $\delta_t \in [2.75\%, 7.25\%]$ (i.e., treatment-on-the-treated)

  ▶ Consistent with our **upper bound** estimate using PPP loan **recipients** where we estimate 8% employment effect

Preliminary Assessment of PPP: Costs per Job Retained

- Estimate cost-per-job for PPP of $224K
    - ▶ $518 billion in total loans disbursed through PPP
    - ▶ 2.31 million jobs supported according to preferred estimate of β_t
    - ▶ Job-cost estimates from $162K to $381K using range of β_t, with preferred estimate of $224K
    - ▶ Note that PPP also averted $6,000 ($= \$600/\text{wk} \times 10$ weeks) in CARES UI payments per job retained ($13.9 bil total)

Preliminary Assessment of PPP: Costs per Job Retained

- $224K per job retained not obviously a bargain, but...
  - ▶ Of 51.1 million jobs 'supported', we estimate that 2.31 million were **preserved** by PPP (4.5%)
  - ▶ May have preserved businesses that would otherwise have failed (we don't yet know)
  - ▶ It dispersed stimulus money rapidly (like CARES UI, household payments) **and** directly raised employment

- Targeting of CARES components
  1. CARES stimulus checks reached 88 million people
  2. CARES UI payments reached 30 million workers
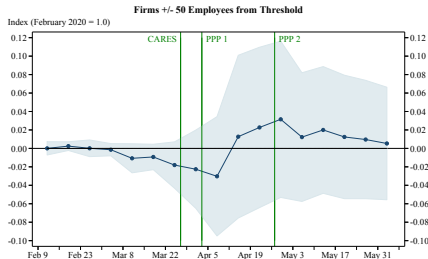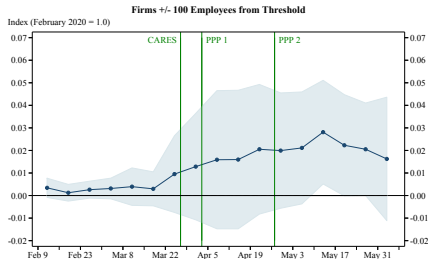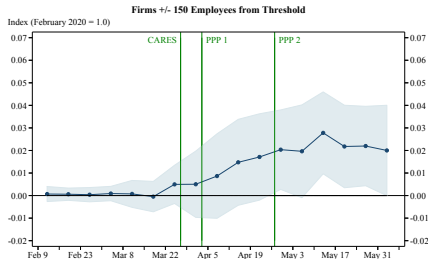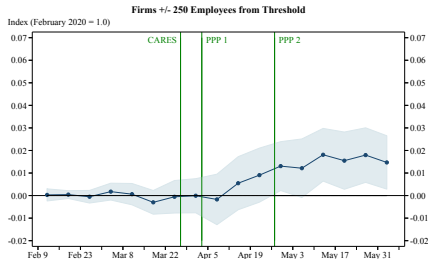 3. CARES PPP payments reached (up to) 4 million businesses and 1.4 to 3.2 million workers

Summary

Summary of Paper

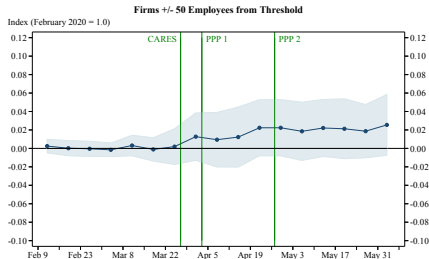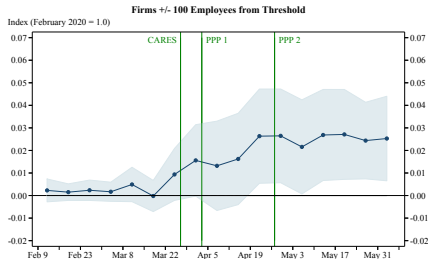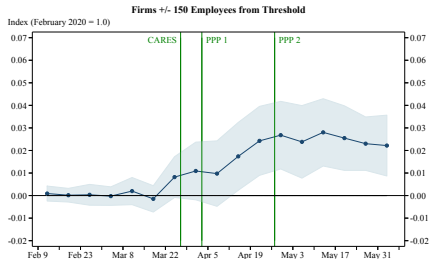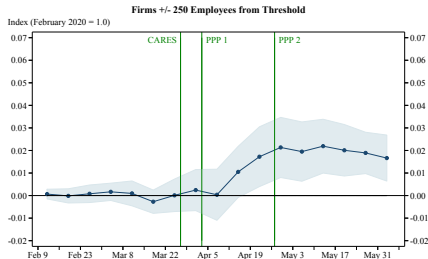- Reduced-form analysis suggests PPP boosted employment by 2.3 million

  - Estimates range from 1.4 million to 3.2 million payroll jobs
  - Implies cost of PPP at $224K per job supported (from $162K to $381K)

- Next steps will be to match PPP loan recipients to payroll data

  - Exploit size eligibility criteria to instrument for PPP loan receipt to address concerns over endogeneity and mismeasurement
  - Allow us to better estimate treatment effects for entire population of PPP eligible firms
  - Analyze longer run employment outcomes to more comprehensively evaluate costs and benefits of PPP

Appendix

Effect on Employment With State-Industry-Week Effects

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Autor et al.   An Evaluation of the Paycheck Protection Program Economic Outlook Talk American Statistical Association

Effect on Employment Using 2019 Firm Size

Firms +/- 250 Employees from Threshold

Firms +/- 150 Employees from Threshold

Firms +/- 100 Employees from Threshold

Firms +/- 50 Employees from Threshold

Back

Effect on Employment Using February 2020 Firm Size

Firms +/- 250 Employees from Threshold

Firms +/- 150 Employees from Threshold

Firms +/- 100 Employees from Threshold

Firms +/- 50 Employees from Threshold

Back