The Impact of COVID Restrictions on Business Dynamics

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ITAM
October 31, 2024

Research Question

How do COVID restrictions influence business dynamics and labor markets?

Why We Care

Economic Structuring: Our research lays the groundwork for anticipating and managing shifts in the economic landscape.

- Reallocation among firm sizes.
- Reallocation across sectors.
- Reallocation in telecommutable vs non-telecommutable industries.
- Reallocation in flexible/contact intense industries.

Key Findings: Broad Impact of COVID-19 Restrictions

- **Widespread Business Failures:** Increase in business exits and closings
  - one std. dev. increase in restrictiveness results in approximately 6% more business failures
- **Decrease in new business formation**
- **Employment:** A slowdown in job creation and an uptick in job losses
  - one std. dev. increase in restrictiveness results in 54% decline in net job creation
- **Cross-Sector and Establishment Size Impact:** Affects various sectors and firm sizes
  - **Information Sector:** Excluded from mandatory restrictions, faced an increase in business failure

Existing COVID Economic Research

- **Focus on Public Firms:** Duchin and Harford (2021) and Barrot, Bonelli, Grassi, and Sauvagnat (2024) analyze the effects of closures on public firms.
- **Emphasis on Voluntary Restrictions:** Bizjak, Kalpathy, Mihov, and Ren (forthcoming) investigates voluntary restrictions' impact on unemployment.
- **Theoretical Predictions:** Eichenbaum, Rebelo, and Trabandt (2021) model how restrictions on human interaction affect economic activity.
- **The Gap:** The effect of mandatory COVID-19 restrictions on U.S. business dynamics using granular data on restrictions on in-person activity.

County-Level Data Sources

- **Restrictions:** Yale SOM-Tobin Center database from 2020-2021.
- **Business Activity:** Census County Business Patterns and Business Dynamics Statistics from 2013-2021.
- **Paycheck Protection Program:** Small Business Administration from 2020-2021.
- **Deaths:** COVID mortality rates from USA Facts from 2020-2021.

Estimating the Influence of Restrictions on Business and Labor Dynamics

$$Y_{it} = \boldsymbol{\beta_A} ACBS_{it} + \boldsymbol{\beta_D} Deaths_{it} + \boldsymbol{\beta_P} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$

- **ACBS:** Average cumulative business restrictions at the end of 2020 and 2021 (cumulative from 2020-2021), value 0 before 2020.
- **Deaths:** COVID Deaths in the county per capita (per 100,000 population), value 0 before 2020.
- **PPP:** Total Payment Protection Program loans initially approved in the county per capita (per 10,000 population), value 0 before 2020.
- $\boldsymbol{Y_{it}}$: Business dynamics and labor outcomes in the county from 2013-2021.
- **Fixed Effects:** θ_t year and γ_i county.

Average Cumulative Business Restrictions (ACBS)

- Data from Yale SOM-Tobin Center State and Local COVID Restriction Database (2020-2021).
- Focus on restrictions for spas, gyms, retail, movies, restaurants, and bars.
- Weekly stringency index: 0 (fully open) to 4 (fully closed).
- Intermediate restrictions:
  - Capacity over 50% $=$ 1.
  - 25% - 50% capacity $=$ 2.
  - Less than 25% capacity $=$ 3.
  - Outdoor-only service $=$ 3.5.
- ACBS $= \sum_{i=1}^{6}$ **(cumulative stringency of business line** i**) / 6**
- Captures intensity (how restrictive) and duration (how long restrictions lasted).

Example: Capturing Intensity and Duration in ACBS

- **County A**: Maximum restrictions (score 4) on all 6 business lines, but only for **2 weeks**.
  - Cumulative stringency per business line: $4 \times 2 = 8$.
  - Total cumulative stringency across all business lines: $8 \times 6 = 48$.
  - $\text{ACBS}_{\text{County A}}$: $\frac{48}{6} = 8$.
- **County B**: Moderate restrictions (score 3) on all 6 business lines, but for **8 weeks**.
  - Cumulative stringency per business line: $3 \times 8 = 24$.
  - Total cumulative stringency across all business lines: $24 \times 6 = 144$.
  - $\text{ACBS}_{\text{County B}}$: $\frac{144}{6} = 24$.
- **Conclusion**: County A had higher short-term severity, but County B's ACBS is higher due to longer duration.

Business Outcome Variables

- **Openings:** New establishments to the county per capita (per $10,000$ population).
- **Applications:** New business applications in the county per capita (per $10,000$ population).
- **EstabsExit:** Establishments exiting the county during the year, scaled by the average number of establishments at times t and $t-1$.
- **FirmDeaths:** Firms headquartered in the county that close all of their establishments during the period per capita (per $10,000$ population).

Labor Market Outcomes

- **Job Destruction:** Employment losses in the county from contracting and closing establishments, normalized by the average employment for times t and $t-1$.
- **Job Destruction Deaths:** Job destruction from establishment closings in the county.
- **Job Creation:** Employment gains in the county from expanding and opening establishments, normalized by the average employment for times t and $t-1$.
- **Job Creation Births:** Job creation from new establishment births in the county.
- **Net Job Creation:** The net effect of job creation minus job destruction in the county.
- **Reallocation:** The sum of job creation and destruction rates minus the absolute value of the net job creation rate in the county.

Summary Statistics COVID Years (2020-2021)

	N	Mean	Median	St. Dev.	Min	Max
openings	6,142	21	20	8	0	615
applications	6,262	147	130	91	0	5,382
estabsExit	6,145	10	10	2	0	53
estabsEntry	6,142	10	10	2	0	66
firmDeaths	6,084	14	13	5	0	95
ACBS	6,262	120	117	43	0	223
Deaths	6,262	173	148	109	0	7,834
PPP	6,262	1,171	1,037	672	0	6,290
jobDestructionDeaths	6,145	4	4	1	0	70
jobDestruction	6,258	13	13	3	0	103
jobCreationBirths	6,142	4	4	1	0	105
netJobCreation	6,258	-2	-1	4	-76	99
jobCreation	6,258	11	11	2	0	108
reallocation	6,258	22	22	4	0	90

Notes: This table shows population-weighted summary statistics of both business, COVID, and labor dynamics measures for the period 2020-2021.

Summary Statistics Pre Period (2013-2019)

	N	Mean	Median	St. Dev.	Min	Max
openings	21,488	21	20	7	0	146
applications	21,917	94	85	48	0	3,806
estabsExit	21,493	9	9	1	0	49
estabsEntry	21,484	10	10	2	0	42
firmDeaths	21,178	12	12	4	0	127
ACBS	21,917	0	0	0	0	0
Deaths	21,917	0	0	0	0	0
PPP	21,917	0	0	0	0	0
jobDestructionDeaths	21,493	4	4	1	0	78
jobDestruction	21,899	11	11	2	0	110
jobCreationBirths	21,484	4	4	1	0	69
netJobCreation	21,899	2	2	3	-101	142
jobCreation	21,900	13	13	3	0	154
reallocation	21,900	21	21	4	0	93

Notes: This table shows population-weighted summary statistics of both business, COVID, and labor dynamics measures for the period 2013-2019.

Summary Statistics Full Sample (2013-2021)

	N	Mean	Median	St. Dev.	Min	Max
openings	27,630	21	20	8	0	615
applications	28,179	106	94	65	0	5,382
estabsExit	27,638	9	9	2	0	53
estabsEntry	27,626	10	10	2	0	67
firmDeaths	27,262	13	12	5	0	127
ACBS	28,179	27	0	54	0	223
Deaths	28,179	39	0	89	0	7,834
PPP	28,179	266	0	586	0	6,290
jobDestructionDeaths	27,638	4	4	1	0	78
jobDestruction	28,157	12	11	3	0	110
jobCreationBirths	27,626	4	4	1	0	105
netJobCreation	28,157	1	2	4	-101	142
jobCreation	28,158	13	13	3	0	154
reallocation	28,158	21	22	4	0	93

Notes: This table shows population-weighted summary statistics of both business, COVID, and labor dynamics measures for the period 2013-2021.

Correlations Among COVID Measures and Business Dynamics 2020-2021

	openings	applications	estabsExit	firmDeaths	netJobCreation	reallocation	ACBS	Deaths	PPP
openings	1.00								
applications	0.60	1.00							
estabsExit	0.49	0.36	1.00						
firmDeaths	0.84	0.41	0.63	1.00					
netJobCreation	-0.07	-0.07	-0.35	-0.25	1.00				
reallocation	0.47	0.32	0.38	0.28	0.12	1.00			
ACBS	0.12	-0.03	0.48	0.28	-0.45	0.11	1.00		
Deaths	-0.13	0.06	0.18	-0.01	-0.38	-0.08	0.24	1.00	
PPP	0.45	0.21	0.08	0.51	0.20	0.05	-0.07	-0.37	1.00

Impact of Restrictions on County Business Activity

$$Y_{it} = \beta_{\boldsymbol{A}} ACBS_{it} + \beta_{\boldsymbol{D}} Deaths_{it} + \beta_{\boldsymbol{P}} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$

Dep. Var.	(1) openings	(2) applications	(3) estabsExit	(4) firmDeaths
ACBS	-0.0039***	-0.23***	0.013***	0.017***
Deaths	-0.0043***	0.0045	0.0016***	-0.0018***
PPP	-1.5e-08***	1.7e-06***	1.2e-08***	8.7e-08***
Observations	27,627	28,179	27,637	27,260
R^2	0.944	0.835	0.740	0.925
Year FEs	Yes	Yes	Yes	Yes
County FEs	Yes	Yes	Yes	Yes
Population-weighted	Yes	Yes	Yes	Yes

Openings: 1 SD ↑ in restrictions ↓ openings by 1% of the median.

Impact of Restrictions on County Business Activity

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R^2	0.944	0.835	0.740	0.925
Year FEs	Yes	Yes	Yes	Yes
County FEs	Yes	Yes	Yes	Yes
Population-weighted	Yes	Yes	Yes	Yes

Applications: 1 SD ↑ in restrictions ↓ applications by 11% of the median.

Impact of Restrictions on County Business Activity

$$Y_{it} = \boldsymbol{\beta_A} ACBS_{it} + \boldsymbol{\beta_D} Deaths_{it} + \boldsymbol{\beta_P} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$

Dep. Var.	(1) openings	(2) applications	(3) estabsExit	(4) firmDeaths
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Observations	27,627	28,179	27,637	27,260
R^2	0.944	0.835	0.740	0.925
Year FEs	Yes	Yes	Yes	Yes
County FEs	Yes	Yes	Yes	Yes
Population-weighted	Yes	Yes	Yes	Yes

Exits: 1 SD ↑ in restrictions ↑ exits by 6% of the median.

Impact of Restrictions on County Business Activity

$$Y_{it} = \boldsymbol{\beta_A} ACBS_{it} + \boldsymbol{\beta_D} Deaths_{it} + \boldsymbol{\beta_P} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$

Dep. Var.	(1) openings	(2) applications	(3) estabsExit	(4) firmDeaths
ACBS	-0.0039***	-0.23***	0.013***	0.017***
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Observations	27,627	28,179	27,637	27,260
R^2	0.944	0.835	0.740	0.925
Year FEs	Yes	Yes	Yes	Yes
County FEs	Yes	Yes	Yes	Yes
Population-weighted	Yes	Yes	Yes	Yes

Firm Deaths: 1 SD ↑ in restrictions ↑ firm Deaths by 6% of the median.

Impact of COVID Restrictions on County Labor Market Activity

$$Y_{it} = \boldsymbol{\beta_A} ACBS_{it} + \boldsymbol{\beta_D} Deaths_{it} + \boldsymbol{\beta_P} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$

	(1)	(2)	(3)
Dep. Var.	jobDestruction	jobCreation	netJobCreation
ACBS	0.020***	-0.0053***	-0.025***
Deaths	-0.0024***	-0.00042	0.0020***
PPP	4.5e-08***	-2.3e-08***	-6.8e-08***
Observations	28,157	28,157	28,157
R^2	0.536	0.551	0.459
Year FEs	Yes	Yes	Yes
County FEs	Yes	Yes	Yes
Population-weighted	Yes	Yes	Yes

ACBS Impact on Job Destruction: 1 SD ↑ in restrictions ↑ job destruction by 8% of the median.

Impact of COVID Restrictions on County Labor Market Activity

$$Y_{it} = \beta_{\boldsymbol{A}} ACBS_{it} + \beta_{\boldsymbol{D}} Deaths_{it} + \beta_{\boldsymbol{P}} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$

	(1)	(2)	(3)
Dep. Var.	jobDestruction	jobCreation	netJobCreation
ACBS	0.020***	-0.0053***	-0.025***
Deaths	-0.0024***	-0.00042	0.0020***
PPP	4.5e-08***	-2.3e-08***	-6.8e-08***
Observations	28,157	28,157	28,157
R^2	0.536	0.551	0.459
Year FEs	Yes	Yes	Yes
County FEs	Yes	Yes	Yes
Population-weighted	Yes	Yes	Yes

ACBS Impact on Job Creation: 1 SD ↑ in restrictions ↓ job creation by 2% of the median.

Impact of COVID Restrictions on County Labor Market Activity

$$Y_{it} = \beta_{\boldsymbol{A}} ACBS_{it} + \beta_{\boldsymbol{D}} Deaths_{it} + \beta_{\boldsymbol{P}} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$

	(1)	(2)	(3)
Dep. Var.	jobDestruction	jobCreation	netJobCreation
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Observations	28,157	28,157	28,157
R^2	0.536	0.551	0.459
Year FEs	Yes	Yes	Yes
County FEs	Yes	Yes	Yes
Population-weighted	Yes	Yes	Yes

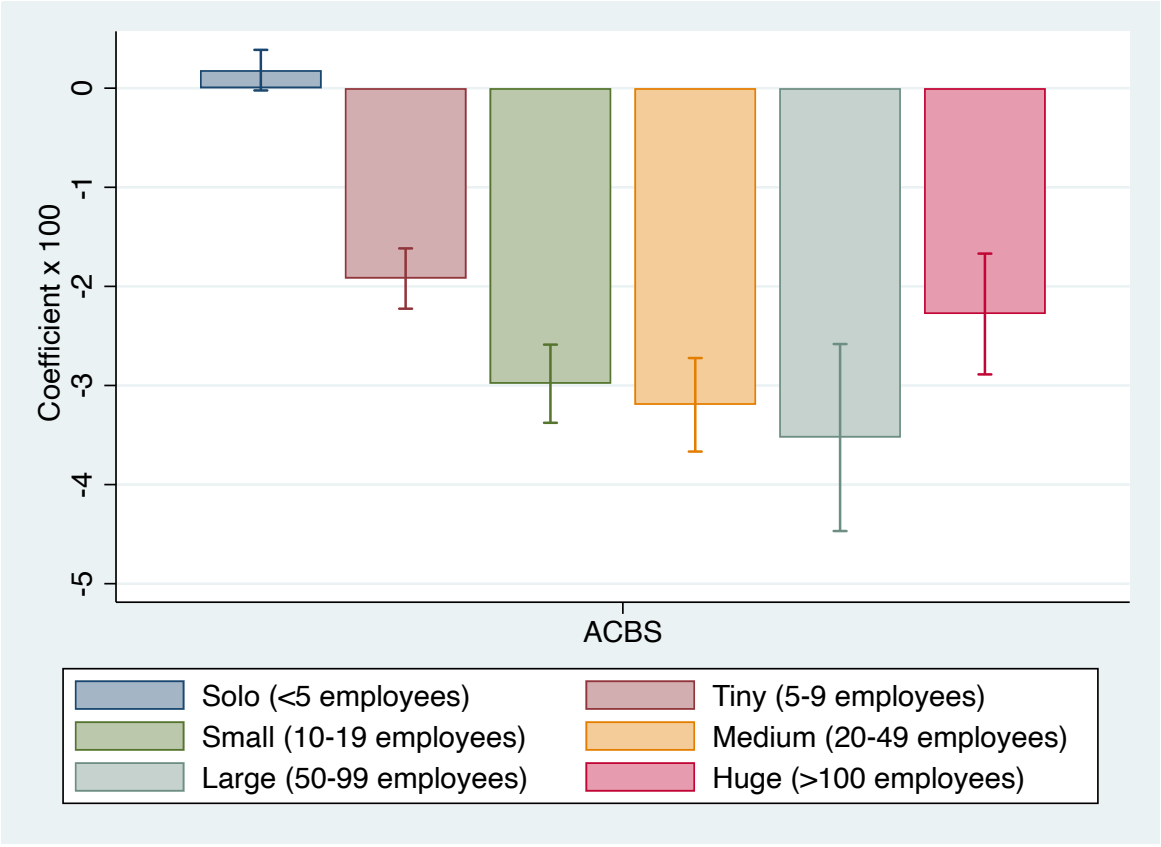
ACBS Impact on Net Job Creation: 1 SD ↑ in restrictions ↓ net job creation by 54% of the median.

Do Restrictions Impact Establishments Across Size Categories?

- **Classification:** Growth rate in the number of establishments in the county classified from solo (1-4 employees) to huge (100+ employees).
- **Analysis:** Examine the growth rate in the number of establishments in each size bin, focusing on how restrictions influence the reallocation of establishments.
- **Findings:**
  - Growth declines across most size categories, especially for larger establishments.
  - Self-employment (1-4 employees) shows a marginal increase in growth, while large (50-99 employees) establishments experience the largest decline.

Restrictions Reduce Establishment Growth

$$Y_{it} = \beta_{\boldsymbol{A}} ACBS_{it} + \beta_{\boldsymbol{D}} Deaths_{it} + \beta_{\boldsymbol{P}} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$



Takeaway: Restrictions reduce establishment growth, but led to a marginal ↑ in sole proprietorships. Suggests individuals may have started small businesses after layoffs.

The Impact of Restrictions by Business Sector

Sectors defined by 2-digit NAICS code:

- Food Service (NAICS 72).
- Construction (NAICS 23).
- Transportation (NAICS 48-49).
- Information (NAICS 51).

Additional Industry Groups:

- Telecommutable industries.
  - Defined by Dingel and Neiman (2020).
- High-Contact industries.
  - Defined by Albanesi and Kim (2021).

Estimating the Influence of Restriction on County Sector Business Activity

$$Y_{it} = \boldsymbol{\beta_A} ACBS_{it} + \boldsymbol{\beta_D} Deaths_{it} + \boldsymbol{\beta_P} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$

- **ACBS:** Average cumulative business restrictions at the end of 2020 and 2021 (cumulative from 2020-2021), value 0 before 2020.
- **Deaths:** COVID Deaths in the county per capita (per 100,000 population), value 0 before 2020.
- **PPP:** Total Payment Protection Program loans initially approved in the county per capita (per 10,000 population), value 0 before 2020.
- $\boldsymbol{Y_{it}}$**:** Business dynamics and labor outcomes at the county-sector level (2-digit NAICS).
- **Fixed Effects:** θ_t year and γ_i county.

Information Sector

- **ACBS Exclusion:** Sector excluded from the ACBS.
- **Capacity Restrictions:** Rarely targeted by COVID capacity restrictions.
- **Work-from-Home Policy:** Instead, people in this sector were told to work from home.
- **Results:** Restrictions led to increased establishment exits in the information sector.

Restrictions Influence Unexpected Sectors: Information Sector

$$Y_{it} = \boldsymbol{\beta_A} ACBS_{it} + \boldsymbol{\beta_D} Deaths_{it} + \boldsymbol{\beta_P} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$

	(1)	(2)
Dep. Var.	estabsEntry	estabsExit
ACBS	0.0062***	0.0073***
Deaths	-0.0001	0.0020**
PPP	0.0006***	0.0001
Observations	9,234	9,234
R^2	0.664	0.634
Year FEs	Yes	Yes
County FEs	Yes	Yes
Population-weighted	Yes	Yes

Takeaway: Restrictions increase establishment entry rates, but exit rates are higher $\rightarrow$ net negative impact on business.

Restrictions Influence Unexpected Sectors: Information Sector

$$Y_{it} = \boldsymbol{\beta_A} ACBS_{it} + \boldsymbol{\beta_D} Deaths_{it} + \boldsymbol{\beta_P} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$

Dep. Var.	(1) estabsEntry	(2) estabsExit
ACBS	0.0062***	0.0073***
Deaths	-0.0001	0.0020**
PPP	0.0006***	0.0001
Observations	9,234	9,234
R^2	0.664	0.634
Year FEs	Yes	Yes
County FEs	Yes	Yes
Population-weighted	Yes	Yes

ACBS Impact on Entry: 1 SD ↑ in restrictions leads to a 2% ↑ in entry rates relative to the median.

Restrictions Influence Unexpected Sectors: Information Sector

$$Y_{it} = \boldsymbol{\beta_A} ACBS_{it} + \boldsymbol{\beta_D} Deaths_{it} + \boldsymbol{\beta_P} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$

	(1)	(2)
Dep. Var.	estabsEntry	estabsExit
ACBS	0.0062***	0.0073***
Deaths	-0.0001	0.0020**
PPP	0.0006***	0.0001
Observations	9,234	9,234
R^2	0.664	0.634
Year FEs	Yes	Yes
County FEs	Yes	Yes
Population-weighted	Yes	Yes

ACBS Impact on Exit: 1 SD ↑ in restrictions leads to a 3% ↑ in exit rates relative to the median.

Other Sector Results

- **Food Service Sector**: Restrictions $\downarrow$ establishment entry and $\uparrow$ exit rates, leading to negative net job creation.
- **Construction Sector**: Restrictions $\downarrow$ entry rates and $\uparrow$ exit rates, resulting in $\downarrow$ net job creation.
- **Transportation Sector**: Both entry and exit rates $\uparrow$, with net job creation $\downarrow$.
- **Information Sector**: Restrictions $\uparrow$ both entry and exit rates, with a shift toward work-from-home policies. Net job creation $\uparrow$.

Do Restrictions Impact Telecommutable Industries?

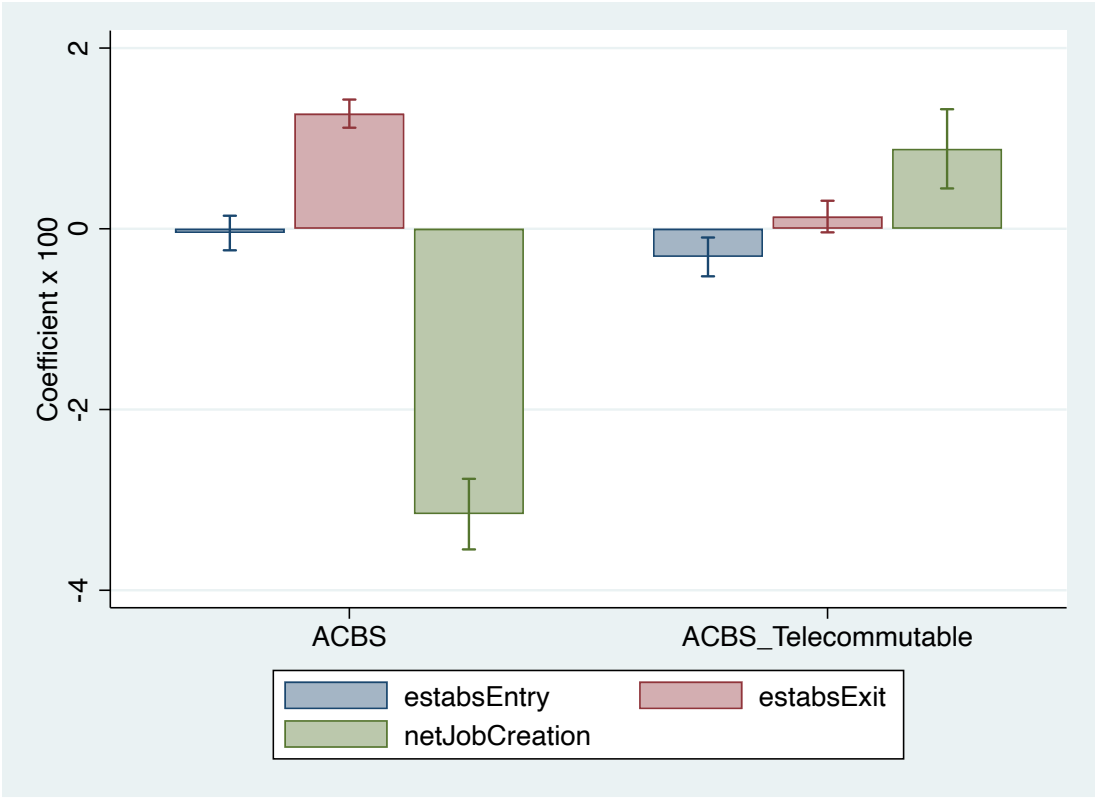
- **Classification:** Telecommutable industries classified according to Dingel and Neiman (2020).
- **Analysis:** Examine business dynamics in subsamples for the top 5 and bottom 5 telecommutable industries.

$$
\begin{aligned}
Y_{ijt} = {} & \beta_A \text{ACBS}_{it} + \beta_D \text{Deaths}_{it} + \beta_P \text{PPP}_{it} \\
& + \beta_T \text{Telecommutable}_{ijt} + \beta_{AT} \text{ACBS\_Telecomm}_{ijt} \\
& + \beta_{DT} \text{Deaths\_Telecomm}_{ijt} + \beta_{PT} \text{PPP\_Telecomm}_{ijt} \\
& + \theta_t + \gamma_i + \epsilon_{ijt}
\end{aligned}
$$

- **Findings:** Restrictions impact both Telecommutable and Non-Telecommutable industries, affecting their entry and exit rates.

Restrictions Impact Telecommutable Industries

$$
\begin{aligned}
Y_{ijt} = {} & \beta_A \text{ACBS}_{it} + \beta_D \text{Deaths}_{it} + \beta_P \text{PPP}_{it} \\
& + \beta_T \text{Telecommutable}_{ijt} + \beta_{AT} \text{ACBS\_Telecomm}_{ijt} \\
& + \beta_{DT} \text{Deaths\_Telecomm}_{ijt} + \beta_{PT} \text{PPP\_Telecomm}_{ijt} \\
& + \theta_t + \gamma_i + \epsilon_{ijt}
\end{aligned}
$$



Do Restrictions Impact High-Contact Industries?

- **Classification:** High- vs. Low-Contact industries classified according to **?** SOC occuptions.
- **Analysis:** Occupations are High-Contact if most of the occupation's interactions occur within 6 feet of another individual.

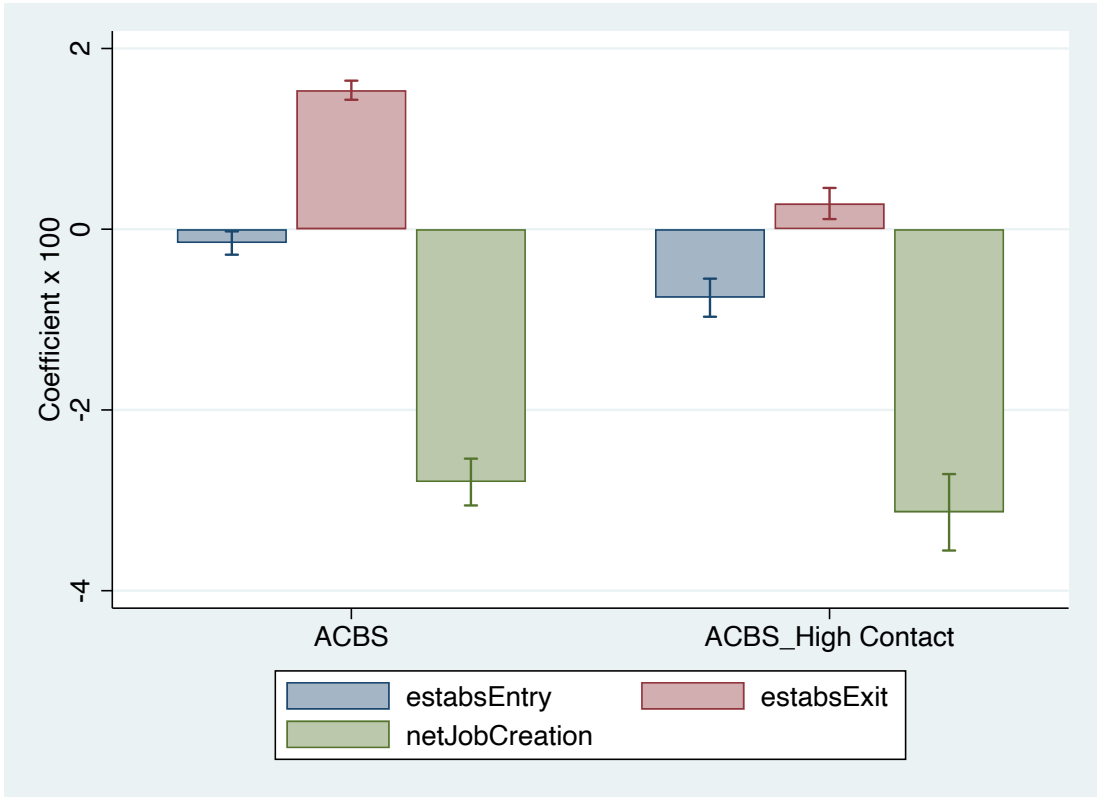
$$
\begin{aligned}
Y_{ijt} = {} & \beta_A \text{ACBS}_{it} + \beta_D \text{Deaths}_{it} + \beta_P \text{PPP}_{it} \\
& + \beta_H \text{HighContact}_{ijt} + \beta_{AH} \text{ACBS\_HighContact}_{ijt} \\
& + \beta_{DH} \text{Deaths\_HighContact}_{ijt} + \beta_{PH} \text{PPP\_HighContact}_{ijt} \\
& + \theta_t + \gamma_i + \epsilon_{ijt}
\end{aligned}
$$

- **Findings:** High-Contact industries have fewer new businesses open, more close, and greater job losses relative to Low-Contact industries.

▸ Classifcation

Restrictions Impact by Industry Contact Intensity

$$
\begin{aligned}
Y_{ijt} = {} & \beta_A \text{ACBS}_{it} + \beta_D \text{Deaths}_{it} + \beta_P \text{PPP}_{it} \\
& + \beta_H \text{HighContact}_{ijt} + \beta_{AH} \text{ACBS\_HighContact}_{ijt} \\
& + \beta_{DH} \text{Deaths\_HighContact}_{ijt} + \beta_{PH} \text{PPP\_HighContact}_{ijt} \\
& + \theta_t + \gamma_i + \epsilon_{ijt}
\end{aligned}
$$



Did We Recover from Restrictions in 2022?

- **Objective**: Assess the extent of economic recovery in 2022 following COVID restrictions from 2020-2021.
- **Focus**: Evaluate whether entry, exit, and net job creation rates show signs of recovery.
- **Method**: Compare coefficients in 2022 to 2020-2021 coefficients, using independent variables from 2021.

Summary of 2022 Partial Recovery Results

- **Openings**: $\uparrow$ business openings, with larger effects relative to 2020-2021.
- **Exits**: $\downarrow$ in establishment exits, with smaller magnitude and partially reversed effects relative to 2020-2021.
- **Net Job Creation**: $\uparrow$ net job creation, suggesting recovery, though not enough to recoup lost jobs in 2020-2021.

2022 Partial Recovery Results

$$Y_{it} = \boldsymbol{\beta_A} ACBS_{it} + \boldsymbol{\beta_D} Deaths_{it} + \boldsymbol{\beta_P} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$

Dep. Var.	Openings	estabsExit	netJobCreation
ACBS	0.0159***	-0.0038***	0.0135***
	(0.0008)	(0.0003)	(0.0011)
Deaths	-0.0002	-0.0010***	-0.0007
	(0.0003)	(0.0001)	(0.0005)
PPP	0.0017***	0.0002***	0.0015***
	(0.0001)	(0.0000)	(0.0001)
Observations	24,549	24,566	25,028
R^2	0.949	0.726	0.332
Year FEs	Yes	Yes	Yes
County FEs	Yes	Yes	Yes
Population-weighted	Yes	Yes	Yes

Takeaway: Openings show a larger magnitude, while establishment exits and net job creation are smaller in magnitude relative to 2020-2021.

Sensitivity Analysis

- Changed the pre-period control time frame.
  - **Result:** No material change.
- Clustered standard errors.
  - **Result:** No material change.
- Orthogonalized ACBS to the COVID death rate.
  - **Result:** No material change.
- Establishment size bins: 1-19, 20-499, 500+ employees using BDS data.
  - **Result:** Consistent $\downarrow$ in entries, $\uparrow$ in exits, and $\downarrow$ job creation across all sizes.

Conclusion: Effects of COVID Restrictions

- **Business Closures:** Widespread and enduring business failures across various sectors.
- **Entrepreneurial Decline:** Significant reduction in new business formation.
- **Labor Market Disruptions:** Persistent job losses and slow job creation, affecting long-term employment dynamics.
- **Broad Economic Impact:** Effects felt across different industries and firm sizes.

Appendix

Industry Flexibility and Contact Intensity

	Low-Contact	**High-Contact**
Inflexible	Agriculture (11)	Healthcare (62)
	Mining (21)	
	Utilities (22)	
	Construction (23)	
	Manufacturing (31-33)	
	Transportation and Warehousing (48-49)	
	Waste Management and Remediation (56)	
	Arts, Entertainment, and Recreation (71)	
	Other Services (81)	
Flexible	Professional, Scientific, and Tech Services (54)	Education (61)
	Management of Companies and Enterprises (55)	
	Wholesale Trade (42)	
	Retail Trade (44-45)	
	Information (51)	
	Finance and Insurance (52)	
	Real Estate and Rental and Leasing (53)	

▸ Back to High-Contact

2017 Pre-Period Impact: COVID Restrictions on County Business Activity

$$Y_{it} = \beta_{\boldsymbol{A}} ACBS_{it} + \beta_{\boldsymbol{D}} Deaths_{it} + \beta_{\boldsymbol{P}} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$

	estabsEntry	estabsExit	netJobCreation
ACBS	-0.0078***	0.0142***	-0.025***
Deaths	-0.0051***	0.0017***	0.0020***
PPP	0.0004***	0.0000	-0.0005***
Observations	15,329	15,332	15,129
R^2	0.952	0.771	0.939
Year FEs	Yes	Yes	Yes
County FEs	Yes	Yes	Yes
Population-weighted	Yes	Yes	Yes

Result: Consistent with 2013 pre-period. Also robust to 2015 pre-period in table A.8. Back to Sensitivity Analysis

State-Clustered Standard Errors

$$Y_{it} = \boldsymbol{\beta_A} ACBS_{it} + \boldsymbol{\beta_D} Deaths_{it} + \boldsymbol{\beta_P} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$

	openings	applications	estabsExit	firmDeaths
ACBS	-0.0039	-0.2269*	0.0134***	0.0170***
	(0.0092)	(0.1247)	(0.0017)	(0.0043)
Deaths	-0.0043***	0.0045	0.0016	-0.0018*
	(0.0016)	(0.0288)	(0.0011)	(0.0010)
PPP	-0.0001	0.0173**	0.0001**	0.0009***
	(0.0005)	(0.0081)	(0.0000)	(0.0001)
Observations	27,627	28,179	27,637	27,260
R^2	0.944	0.835	0.740	0.925
Year FEs	Yes	Yes	Yes	Yes
County FEs	Yes	Yes	Yes	Yes
Population-weighted	Yes	Yes	Yes	Yes
State Cluster	Yes	Yes	Yes	Yes

Back to Sensitivity Analysis

Orthogonalized ACBS to COVID Deaths

$$Y_{it} = \beta_{\boldsymbol{A}} ACBS_{it} + \beta_{\boldsymbol{D}} Deaths_{it} + \beta_{\boldsymbol{P}} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$

	openings	applications	estabsExit	firmDeaths
excess_ACBS	-0.0092***	-0.2585***	0.0106***	0.0116***
	(0.0016)	(0.0302)	(0.0007)	(0.0011)
Deaths	-0.0026***	0.0295**	0.0007*	-0.0030***
	(0.0007)	(0.0124)	(0.0004)	(0.0006)
PPP	-0.0004**	0.0120***	0.0002***	0.0009***
	(0.0002)	(0.0034)	(0.0001)	(0.0002)
Observations	5,300	5,300	5,300	5,300
R^2	0.951	0.874	0.767	0.929
Year FEs	Yes	Yes	Yes	Yes
County FEs	Yes	Yes	Yes	Yes
Population	100,000+	100,000+	100,000+	100,000+
Population-weighted	No	No	No	No

▸ Back to Sensitivity Analysis

Impact of Restrictions on Establishments 500+ Employees

$$Y_{it} = \beta_{\boldsymbol{A}} ACBS_{it} + \beta_{\boldsymbol{D}} Deaths_{it} + \beta_{\boldsymbol{P}} PPP_{it} + \theta_t + \gamma_i + \epsilon_{it}$$

	estabsEntry	estabsExit	netJobCreation
ACBS	-0.0039***	0.0044***	-0.0060***
	(0.0009)	(0.0008)	(0.0023)
Deaths	0.0006	-0.0011***	-0.0012
	(0.0004)	(0.0004)	(0.0011)
PPP	-0.0000	-0.0002***	-0.0007***
	(0.0001)	(0.0001)	(0.0002)
Observations	12,720	12,720	12,720
R^2	0.565	0.623	0.364
Year FEs	Yes	Yes	Yes
County FEs	Yes	Yes	Yes
Population-weighted	Yes	Yes	Yes

Back to Sensitivity Analysis

Impact of COVID Restrictions on Food Service Sector

- **Entry and Exit**: Restrictions ↓ establishment entry and ↑ exit rates.
- **Net Job Impact**: Net job creation ↓.

Dep. Var.	estabsEntry	estabsExit	netJobCreation
ACBS	-0.0082***	0.0277***	-0.0918***
Deaths	0.0002	-0.0007	0.0141***
PPP	-0.0001	0.0005***	-0.0032***
Observations	15,834	15,834	15,834
R^2	0.521	0.510	0.691
Year FEs	Yes	Yes	Yes
County FEs	Yes	Yes	Yes
Population-weighted	Yes	Yes	Yes

▸ Back to Sector Results Summary

Impact of COVID Restrictions on Construction Sector

- **Entry and Exit**: Restrictions ↓ establishment entry and ↑ exit rates.
- **Net Job Impact**: Net job creation ↓.

Dep. Var.	estabsEntry	estabsExit	netJobCreation
ACBS	-0.0135***	0.0078***	-0.0237***
Deaths	0.0003	0.0032***	0.0002
PPP	-0.0002***	0.0003***	-0.0017***
Observations	16,470	16,470	16,470
R^2	0.646	0.544	0.234
Year FEs	Yes	Yes	Yes
County FEs	Yes	Yes	Yes
Population-weighted	Yes	Yes	Yes

Back to Sector Results Summary

Impact of COVID Restrictions on Transportation Sector

- **Entry and Exit**: Restrictions ↑ both establishment entry and exit rates.
- **Net Job Impact**: Net job creation ↓.

Dep. Var.	estabsEntry	estabsExit	netJobCreation
ACBS	0.0068***	0.0128***	-0.0106*
Deaths	-0.0077***	0.0043***	-0.0105***
PPP	-0.0001	0.0003***	-0.0008**
Observations	10,547	10,547	10,547
R^2	0.617	0.474	0.242
Year FEs	Yes	Yes	Yes
County FEs	Yes	Yes	Yes
Population-weighted	Yes	Yes	Yes

▸ Back to Sector Results Summary

Impact of COVID Restrictions on Information Sector

- **Entry and Exit**: Restrictions ↑ both establishment entry and exit rates.
- **Net Job Impact**: Net job creation remained positive in this sector, although insignificant.

Dep. Var.	estabsEntry	estabsExit	netJobCreation
ACBS	0.0062***	0.0073***	0.0099
Deaths	-0.0001	0.0020**	0.0026
PPP	0.0006***	0.0001	0.0016***
Observations	9,234	9,234	9,234
R^2	0.664	0.634	0.294
Year FEs	Yes	Yes	Yes
County FEs	Yes	Yes	Yes
Population-weighted	Yes	Yes	Yes

Back to Sector Results Summary

Albanesi, S. and J. Kim (2021): "Effects of the COVID-19 Recession on the US Labor Market: Occupation, Family, and Gender," Journal of Economic Perspectives, 35, 3–24.

Barrot, J.-N., M. Bonelli, B. Grassi, and J. Sauvagnat (2024): "Causal effects of closing businesses in a pandemic," Journal of Financial Economics, 154.

Bizjak, J. M., S. L. Kalpathy, V. T. Mihov, and J. Ren (forthcoming): "COVID-19 Vaccinations, Business Activity, and Firm Value," Journal of Financial and Quantitative Analysis.

Dingel, J. I. and B. Neiman (2020): "How many jobs can be done at home?" Journal of Public Economics, 189, 104235.

Duchin, R. and J. Harford (2021): "The COVID-19 crisis and the allocation of capital," Journal of Financial and Quantitative Analysis, 56, 2309–2319.

Eichenbaum, M. S., S. Rebelo, and M. Trabandt (2021): "The Macroeconomics of Epidemics," Review of Financial Studies, 34, 5149–5187.