Preserving job matches during the COVID-19 pandemic: firm-level evidence on the role of government aid

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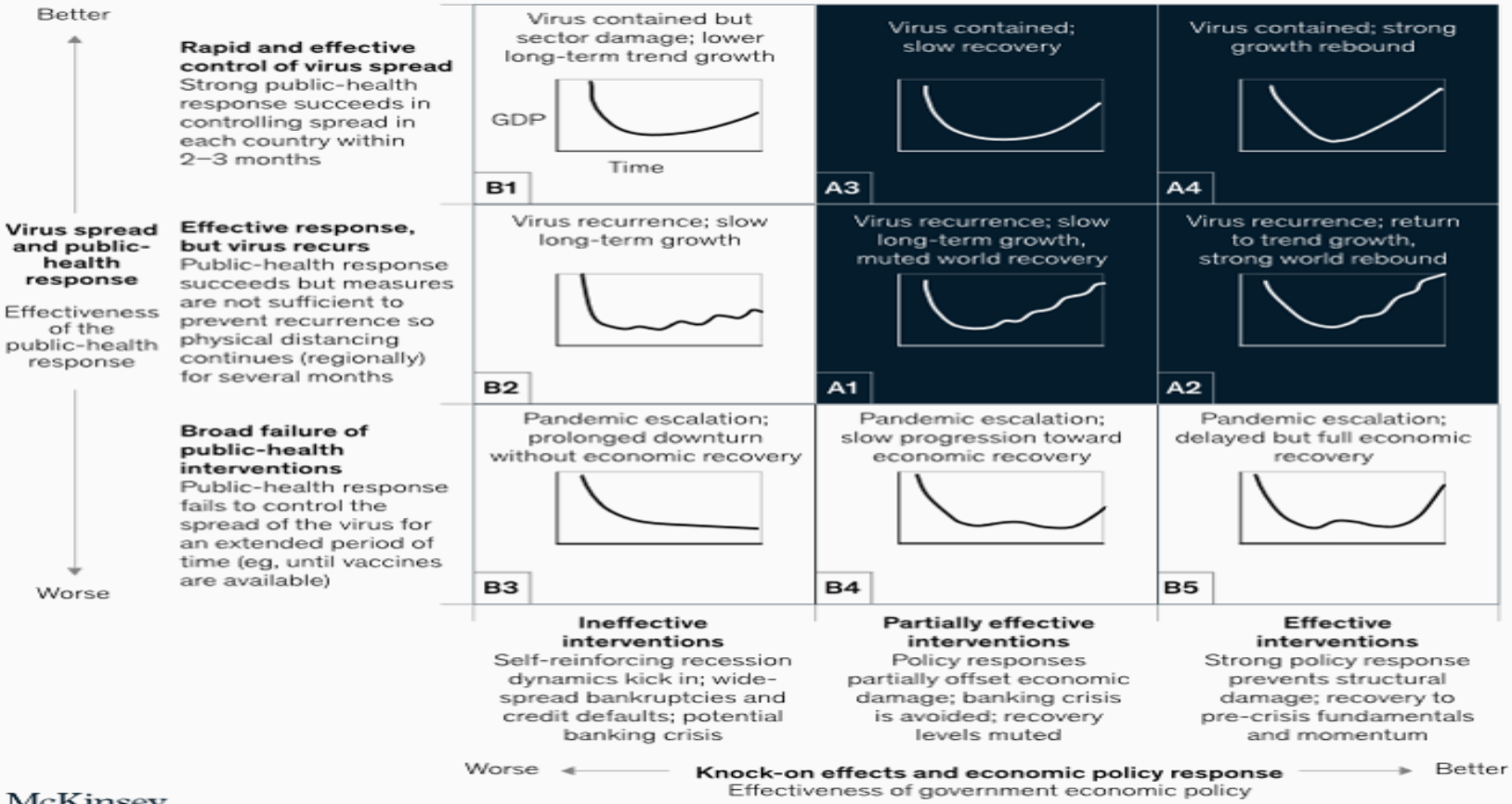
Motivation: The DUAL Challenges of COVID19

Scenarios for the economic impact of the COVID-19 crisis.

GDP impact of COVID-19 spread, public-health response, and economic policies



McKinsey & Company

Motivation: Governments Responses to COVID19

Country	Furlough support/LABOUR	Loan and grant	Cost subsidy/COST	Others/FISCAL
Denmark	- 75% of employee salaries are covered by the government, up to DKK30,000 per employee per month. To be eligible the firm would have to layoff at least 30% of its employees. The firm covers the remaining 25% of the salaries.	Loan guarantee on 70% of new corporate loans related to COVID-19. Small and medium size companies: Operating losses of 50% or more. Large companies: Revenue losses of 30% or more.	Between 25% and 80% of fixed costs might be compensated by the state for firms experiencing between 35 and 100% decreases in turnover, but remaining open. 100% of fixed costs are compensated for firms forced to close.	Employers are paid sickness reimbursement for salaries and benefits from to first day of absence instead of the 30th. Postponement of VAT payments by 30 days for larger firms
Germany	- Govt. covers up to 80% (87 if family) of salaries and 100 % of the social-security contributions for reduced working hours. Working hours can be reduced with reduced wages. Eligibility: at least 10% of workers affected	100% - loan guarantee up to 25% of the revenue of 2019 For: Maximum of EUR 500,000 in loans for firms with 10-50 employees and 800k for more than 50 employees.	Direct payment to self-employed and firms with 10 employees or less, up to EUR 15,000.	Reduced VAT rate to 7% for restaurants for 12 months
Sweden	- Employers can cut the working hours of employers by up to 80% Government covers most of the salary, workers receive 90% of their salary.	- Loan guarantee of 70% to companies, up to SEK 75 million in loans per company. No legal company size limit	Between 22.5% and 75% of fixed costs are covered for firms with at least SEK 250,000 in turnover last year and a decrease of at least 30% this year.	VAT by sole proprietors might be postponed.

Aim of the paper

- Understand the impact of policy on the expected impact on firms and workers
- We build a new dataset of survey and register data that allows for the first analysis using data on actual labour choices of firms
- Couple with elicited counterfactuals in the absence of government aid
- We asked firms about pandemic-related disruptions to their normal operations
- Focus on aid take-up and labour arrangements, such as number of furloughed and laid off employees
- For aid-taking firms, we elicited expectations of these labour choices in the absence of government aid
- We will link survey data to employee-level government data on aid recipients from June 2020, and register and accounting data from 2016 to 2019

What We Do

- Survey to 44,374 firms in Denmark.
  - Active incorporated firms in Denmark with 3 to 20,000 employees
  - 10,642 responses (April and May 2020)
  - Response rate 24 percent and representative
- Ask about firm and employment consequences, expectations about impact on layoffs with and without use and relevance of government programmes
- We also ask them about expected survival
- Many firms use more than one programme

Data and Methodology

- Use our survey data to compare expected changes with and without policy
- Use register data to estimate the distribution of revenue changes in a normal year (see figure 5)
- Use register data to match to our survey data to the government register on the requests for wage aid from 9 March to 8 June (90 percent match on wages and furloughs)

Survey Response

	Resp N	Popn N	Response rate	Share in sample	Share in popn
Firm size					
3-5 emp	3202	15768	0.20	0.30	0.36
6-9 emp	2283	10488	0.22	0.22	0.24
10-25 emp	2817	10860	0.26	0.27	0.24
26-50 emp	1063	3801	0.28	0.10	0.09
51+ emp	1200	3457	0.35	0.11	0.08
Industry					
Accommodation/Food	472	2840	0.17	0.04	0.06
Construction	1477	7182	0.21	0.14	0.16
Manufacturing	1561	5416	0.29	0.15	0.12
Other	2406	10497	0.23	0.23	0.24
Professional/Technical	1116	3892	0.29	0.11	0.09
Publishing/Broadcasting	788	3001	0.26	0.07	0.07
Wholesale/Retail	2745	11546	0.24	0.26	0.26
Total	10565	44374	0.24	1.00	1.00

Is Our Survey Representative?

Figure 1: CDF: Employee representativeness

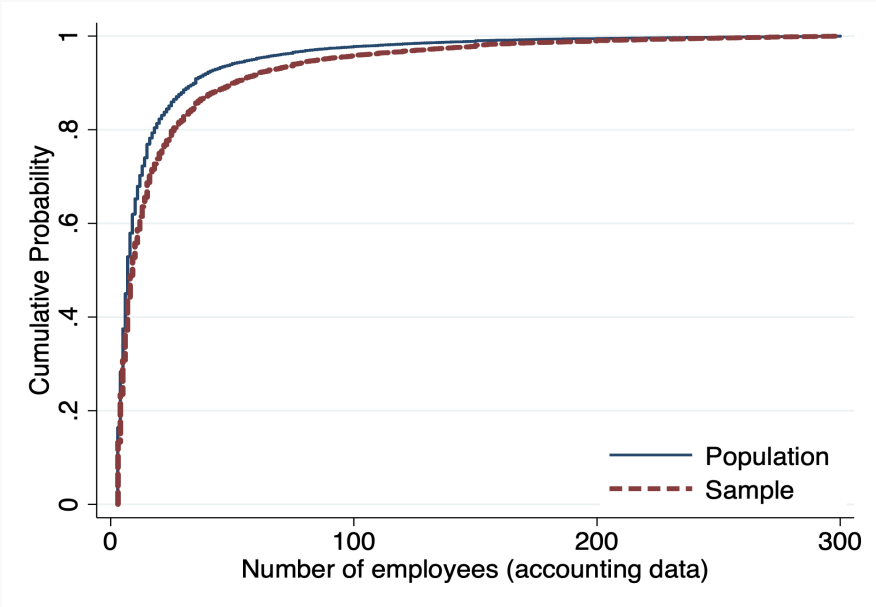
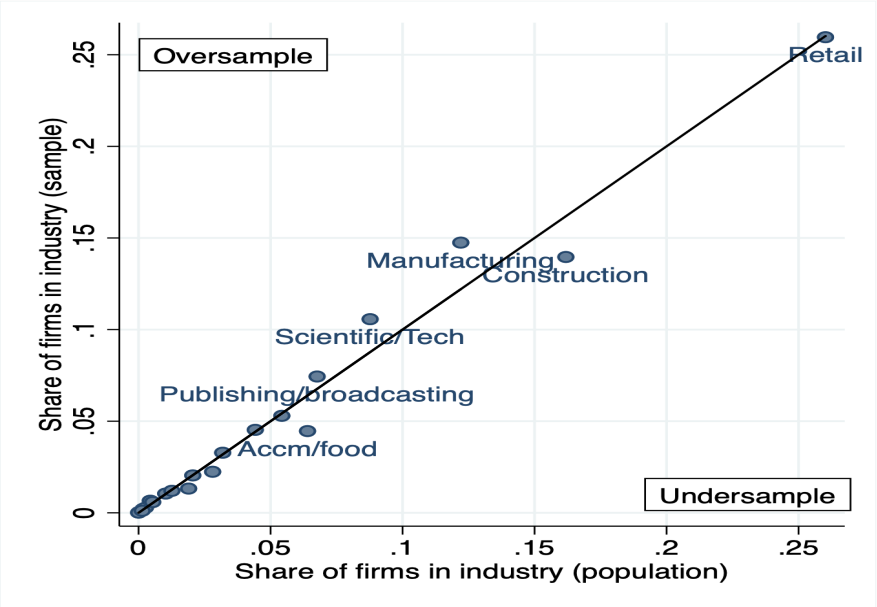


Figure 2: Employee representativeness across industry



Is Our Survey Representative?

Figure 3: Firm size distribution in population

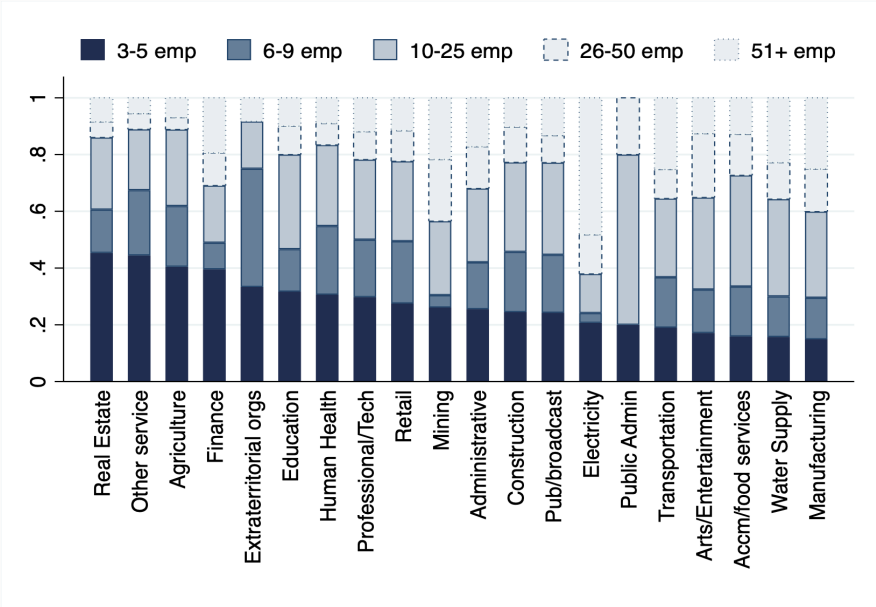
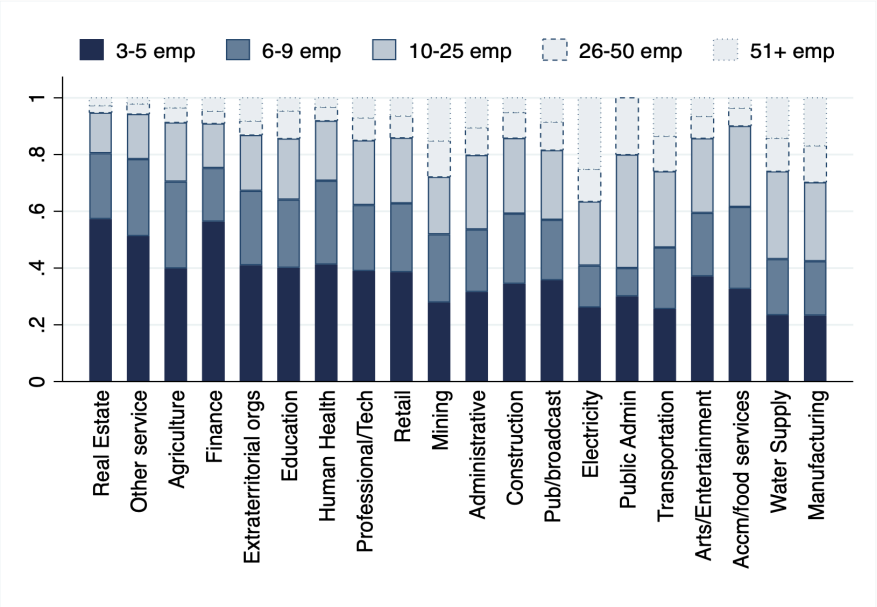
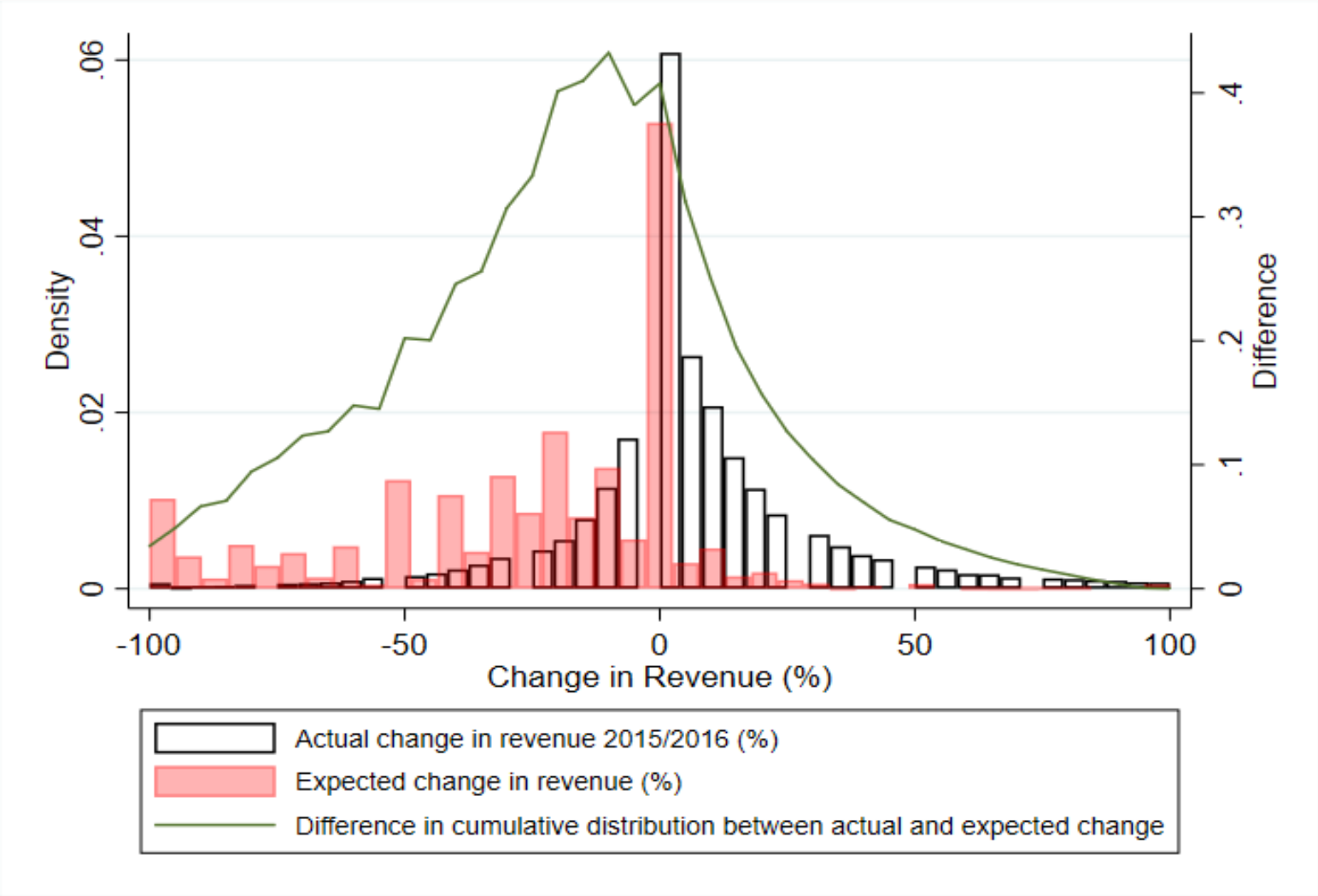


Figure 4: Firm size distribution in survey



Expected Change in Revenue

Figure 5: Actual and expected revenue changes



Expected Change in Revenue

Figure 6: Revenue expectation across size band

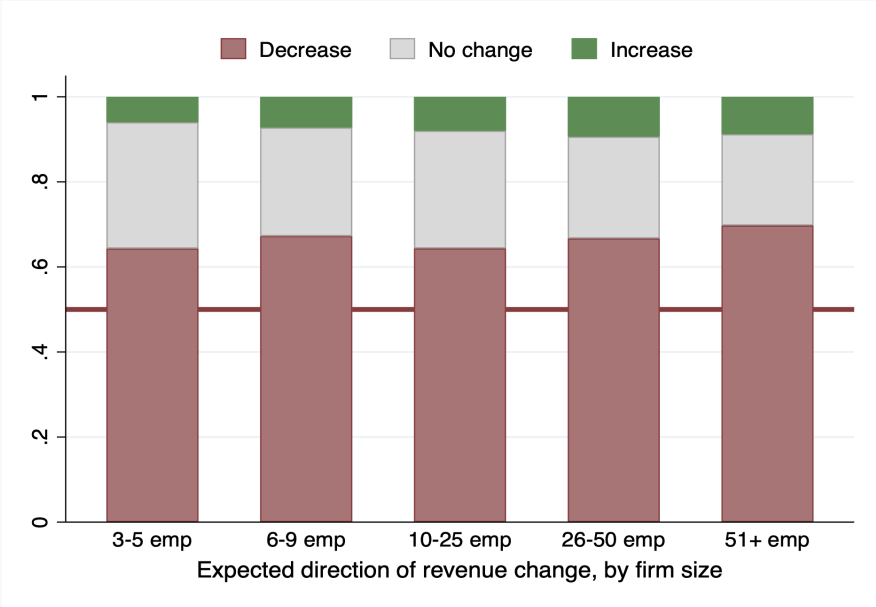
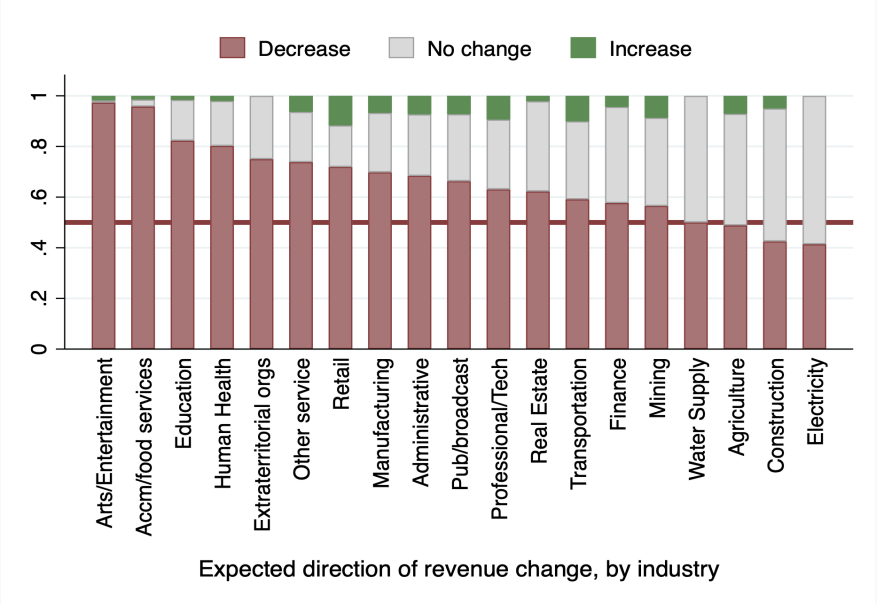


Figure 7: Revenue expectation across industry

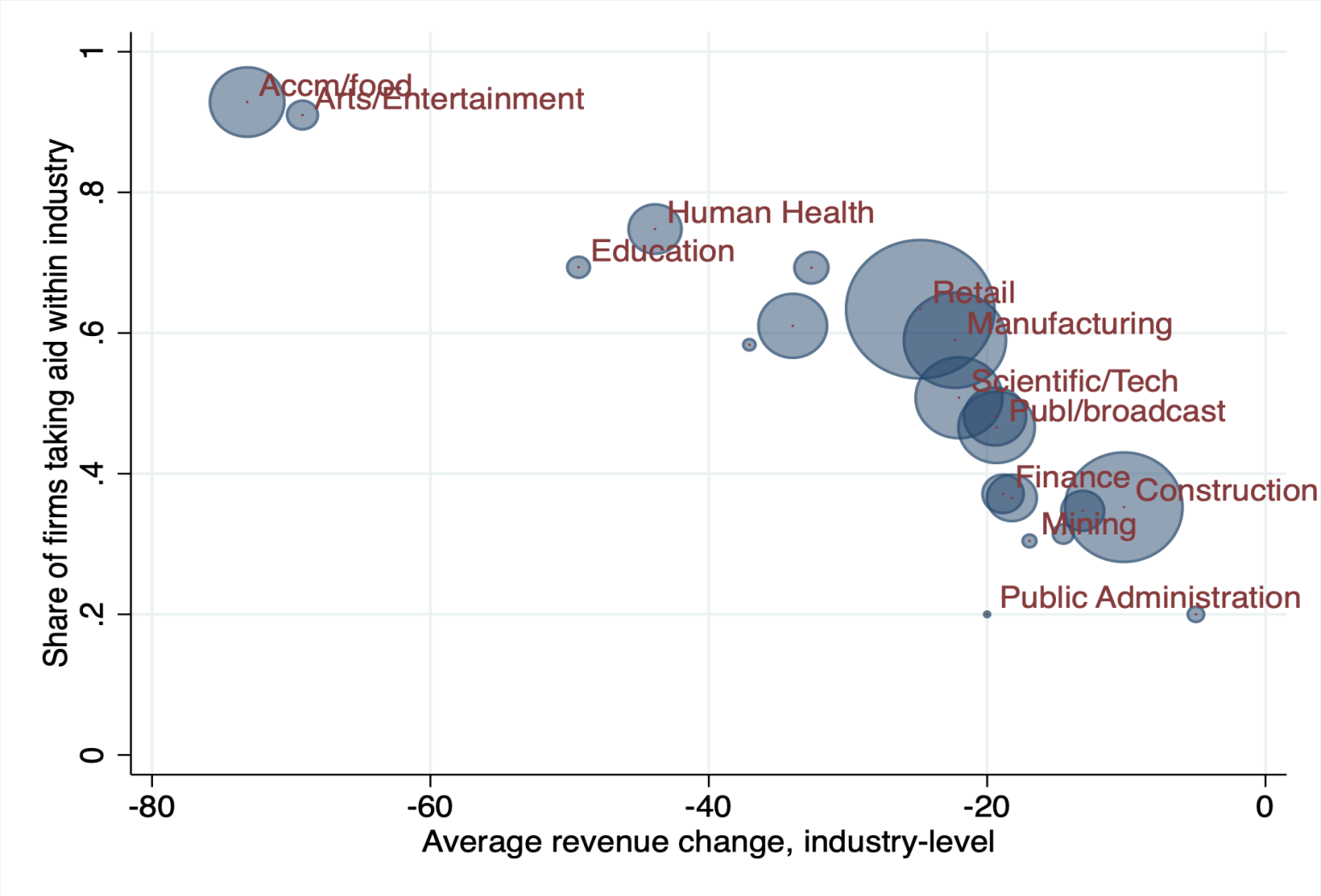


Results 1: Revenue changes

- Firms in Denmark were hit hard by the pandemic
- Seven percent more firms face revenue declines of more than 90 percent, compared to in 2016
- 32 percent of firms in early 2020 are experiencing revenue declines larger than 35 percent. In a normal year it would be 6-7 percent
- Firms that have taken up government support tend to be those firms that report being in the highest levels of distress (median firm reporting not receiving any aid has an expected revenue change of zero)

Aid Taking - Revenue Changes

Figure 8: Aid taking across industry



Labour Response to Revenue Changes

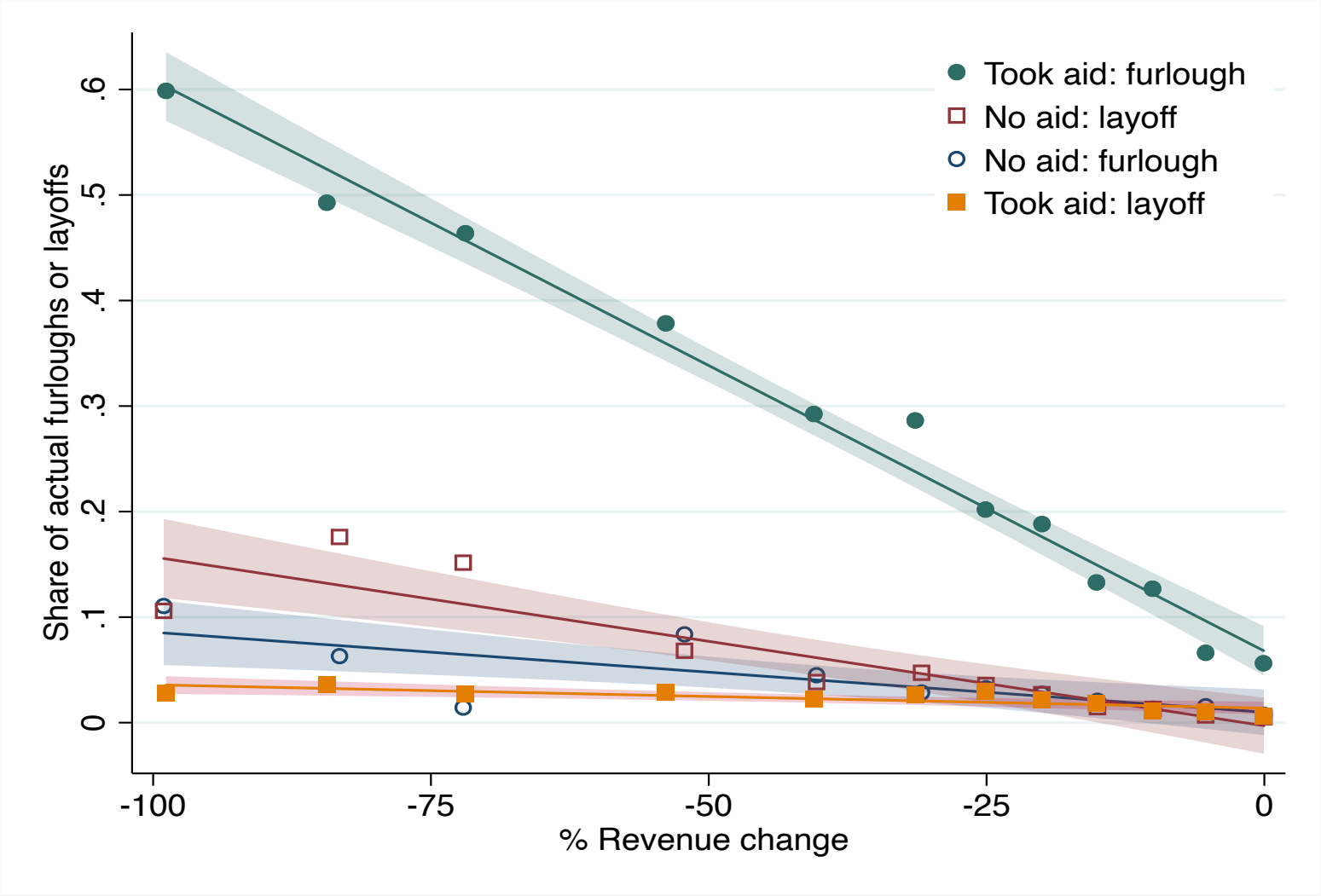
	All types		Only one type			2 types		
	(1) Any aid	(2) All three	(3) Labor	(4) Cost	(5) Fiscal	(6) Labor+Cost	(7) Labor+Fiscal	(8) Cost+Fiscal
Revenue change								
Increase	-0.459***	-0.181***	0.042	-0.030***	0.336***	-0.123***	0.002	-0.046***
	(0.016)	(0.011)	(0.030)	(0.008)	(0.035)	(0.006)	(0.029)	(0.008)
No change	-0.420***	-0.164***	0.018	-0.045***	0.369***	-0.115***	-0.009	-0.053***
	(0.011)	(0.007)	(0.018)	(0.004)	(0.020)	(0.006)	(0.016)	(0.004)
Firm characteristics								
Ln(employment)	0.022***	0.005	0.007*	-0.015***	0.003	-0.030***	0.044***	-0.014***
	(0.003)	(0.004)	(0.004)	(0.002)	(0.004)	(0.003)	(0.004)	(0.002)
Industry								
Manufacturing	0.128***	0.048	0.100***	0.006	-0.237***	0.053**	0.108***	-0.079**
	(0.033)	(0.033)	(0.036)	(0.023)	(0.058)	(0.025)	(0.034)	(0.039)
Construction	0.015	-0.018	0.180***	0.008	-0.175***	0.025	0.078**	-0.098**
	(0.033)	(0.033)	(0.039)	(0.024)	(0.060)	(0.025)	(0.035)	(0.039)
Retail	0.178***	0.100***	0.121***	-0.013	-0.308***	0.087***	0.104***	-0.092**
	(0.032)	(0.032)	(0.035)	(0.023)	(0.057)	(0.024)	(0.033)	(0.039)
Accm/Food	0.366***	0.373***	-0.040	0.017	-0.441***	0.222***	-0.050	-0.081**
	(0.033)	(0.039)	(0.035)	(0.025)	(0.057)	(0.032)	(0.033)	(0.040)
Professional	0.086***	0.048	0.069*	-0.004	-0.199***	0.075***	0.070**	-0.059
	(0.033)	(0.034)	(0.037)	(0.024)	(0.059)	(0.027)	(0.035)	(0.040)
Education	0.267***	0.234***	0.111***	-0.013	-0.458***	0.242***	0.006	-0.123***
	(0.036)	(0.043)	(0.042)	(0.025)	(0.057)	(0.036)	(0.036)	(0.040)
Arts	0.228***	0.091*	0.098*	0.009	-0.359***	0.215***	0.066	-0.120***
	(0.046)	(0.053)	(0.054)	(0.034)	(0.066)	(0.053)	(0.048)	(0.042)
Observations	10505	5868	5868	5868	5868	5868	5868	5868
Share of firms (total)	0.555	0.107	0.106	0.023	0.124	0.077	0.092	0.027
Share of empl (total)	0.569	0.101	0.141	0.006	0.159	0.028	0.127	0.007
Share of firms (aid)	1.000	0.193	0.190	0.041	0.223	0.138	0.165	0.049
Share of empl (aid)	1.000	0.177	0.248	0.010	0.280	0.049	0.223	0.012

Results 2: Labour response to revenue changes

- 56 percent of firms took on aid
- Less likely to do so if no change or increase in revenue
- 11 percent of firms took all aid types

Labour Response to Revenue Changes

Figure 9: Furlough and layoff tendency



Labour Response to Revenue Changes: Table 3

	Only Aid Takers		All firms	
	(1) Furlough	(2) Layoff	(3) Furlough	(4) Layoff
Aid eligible			-0.020***	0.014***
			(0.004)	(0.002)
Observed outcomes				
Labor aid	0.256***	-0.060***	0.269***	-0.044***
	(0.008)	(0.005)	(0.006)	(0.003)
Cost aid	0.039***	-0.068***	0.057***	-0.001
	(0.010)	(0.005)	(0.009)	(0.004)
Fiscal aid	-0.011	0.011***	-0.008	0.007***
	(0.007)	(0.004)	(0.006)	(0.002)
Reported counterfactuals				
Labor aid	0.048***	0.135***		
	(0.008)	(0.007)		
Cost aid	-0.000	0.122***		
	(0.010)	(0.008)		
Fiscal aid	0.016**	0.024***		
	(0.008)	(0.006)		
Firm controls	✓	✓	✓	✓
Industry	✓	✓	✓	✓
Observations	10540	10678	9267	9267
# Firms	5270	5339	9267	9267

Estimates based on counterfactuals

- To address the self-selection of firms, we asked respondents to report their expected counterfactual choices: two observations for each firm: 1) actual furloughs and layoff and 2) their counterfactual furloughs and layoffs they say they would have chosen in the absence of aid
- Among firms that took aid, we asked what share of workers they would have laid off and furloughed in the absence of aid
- Furthermore, we can also observe how firm's adoption of different aid packages is correlated with their outcomes in the absence of treatment
- Using these data, we estimate a model:

$$Y_{jT} = \alpha + \beta_0^L L_j + \beta_0^C C_j + \beta_0^F F_j$$

$$+ \mathrm{T} \times \left(\beta_1^L L_j + \beta_1^C C_j + \beta_1^F F_j\right) + X_j\gamma + \varepsilon_{js}(1)$$

Estimates based on counterfactuals

$$Y_{jT} = \alpha + \beta_0^L L_j + \beta_0^C C_j + \beta_0^F F_j$$
$$+ \mathrm{T} \times \left(\beta_1^L L_j + \beta_1^C C_j + \beta_1^F F_j\right) + X_j\gamma + \varepsilon_{js}(2)$$

- Firms are indexed by j, $T = 0$ is the firm's reported outcomes in the absence of aid, and $T = 1$ is the firm's actual outcomes
- Labour aid (L_j), cost aid (C_j), or fiscal aid (F_j)
- The coefficients $\beta_0^L, \beta_0^C, \beta_0^F$ measure differences in counterfactual outcomes for firms that took up particular aid packages. The coefficients $\beta_1^L, \beta_1^C, \beta_1^F$ measure the difference in observed outcomes, relative to counterfactuals, for a given aid package
- Firm-specific controls, X_j, include log of January employment, the size of the revenue change, and industry at the 2-digit NACE level
- The term ε_{jT} is the error term
- $\beta_1^L, \beta_1^C, \beta_1^F$ are effects of treatment on the treated (aid-takers)

Results, counterfactuals

- Firms that took labour aid increase the share of furloughs by 25.6 percentage points (column (1) and (2)in Table 3)
- The reduction in layoffs from taking labor aid is -6.0 percentage points
- Cost aid also increases the furlough share, but by a smaller margin: 3.9 percentage points
- Cost aid also reduces layoffs by 6.8 percentage points
- Fiscal aid, however, is estimated to increase layoffs by 1.1 percentage points
- Choosing labour aid expected 4.8 percentage points more furloughs, and 13.5 percentage points more layoffs, relative to firms that also took aid but chose different packages

Estimates based on observables

- Columns (3) and (4) in Table 3 compare actual reported outcomes between firms that took aid and firms that did not
- Identified under the assumption that firms' counterfactual outcomes in the absence of aid are well-proxied by the actual outcomes of the firms that did not take aid (benchmark)
- Estimate a standard cross-sectional model

$$Y_j = \alpha + \beta^L L_j + \beta^C C_j + \beta^F F_j + X_j\gamma + \varepsilon_j \tag{3}$$

- We assume $E[\varepsilon_j | L_j, C_j, F_j, X_j] = 0$.

Estimates based on observables

- Comparing column (1) and (2) to (3) and (4)) in Table 3
- LABOUR aid leads to large increases in the share of workers furloughed and reductions in the share of workers laid off
- COST aid: less clear. Both models indicate that cost aid increases the furlough share by 3.9 to 5.7 percentage points, but the models disagree about the effect on layoffs. Could be because firms taking cost aid would have higher layoffs in the absence of aid than firms that did not take aid
- FISCAL aid: no effect on furloughs, and a small, but statistically significant positive effect on layoffs. Around 16 percent of all workers, so even this small increase in layoffs could have a significant impact on the total number of workers who lose their jobs.
- Furthermore, taking fiscal aid alone is more likely among firms who did not experience revenue declines, and that are not in the most affected industries

Results 3: Labour response to revenue changes

- State aid has led firms to keep their employees: Employees have been furloughed instead of being fired
- The average firm taking aid furloughed 30 percent and laid off only 2 percent of workers
- Without aid, they predict that they would have furloughed closer to 17 percent and laid off 25 percent of workers
- Our estimates suggest that the aid policies helped to reduce layoffs by approximately 81,000 jobs
- We find a weak relationship between take-up of fixed cost or fiscal (tax) aid, unless coupled with labour aid take-up

Furlough Numbers

Figure 10: Distribution of shares of furloughed workers

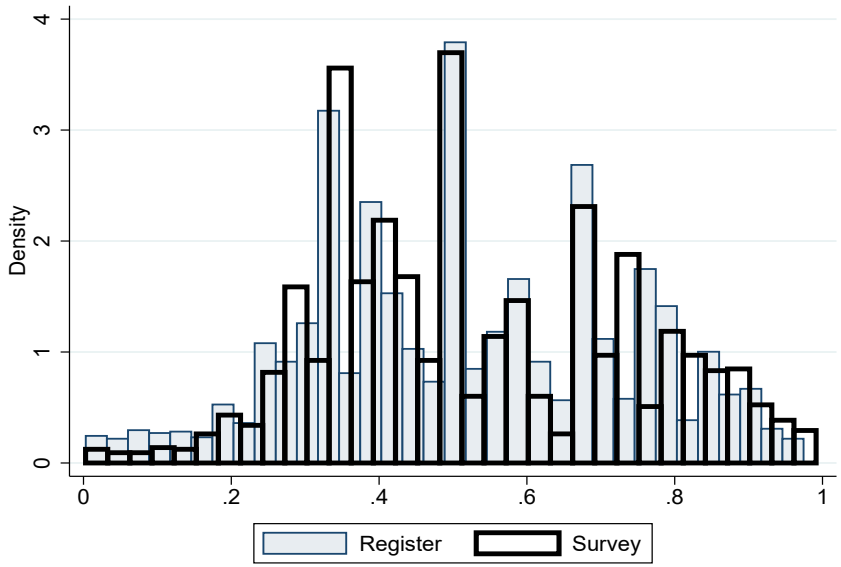
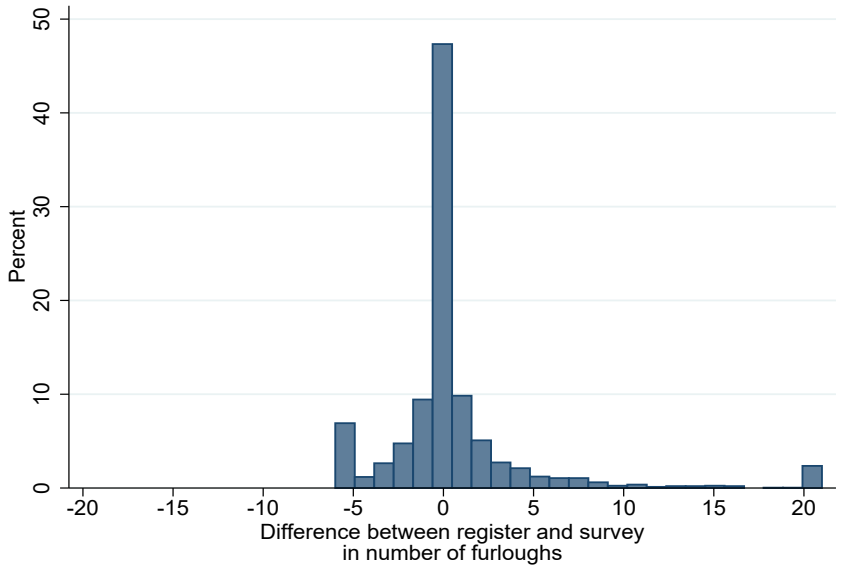


Figure 11: Distribution of the difference in actual furloughed workers



Financial Indicators

	Mo. costs (Jan)	Mo. costs (April)	Lab. share cost (Jan)	Lab. share cost (Apr)	Fix share cost (Jan)	Fix share cost (Apr)	Liq (Jan) 100k Kr.	Liq (Apr) 100k Kr.
Decrease	31.43	21.98	0.58	0.59	0.31	0.35	45.87	44.12
Increase	40.68	28.75	0.56	0.58	0.29	0.30	50.06	52.32
No change	31.96	24.20	0.57	0.59	0.29	0.31	50.05	51.20
By aid recipient								
Did not take aid	37.02	26.22	0.58	0.60	0.29	0.31	52.21	52.46
Took aid	29.49	21.06	0.58	0.58	0.31	0.35	43.95	42.49
By firm size								
3-5 emp	4.85	2.89	0.58	0.59	0.32	0.35	19.06	18.22
6-9 emp	8.09	5.58	0.59	0.60	0.30	0.33	22.10	21.70
10-25 emp	17.89	12.83	0.59	0.60	0.30	0.33	38.85	38.01
26-50 emp	39.78	27.10	0.57	0.58	0.29	0.33	67.66	66.73
51+ emp	140.22	106.08	0.54	0.55	0.30	0.33	139.10	138.00
Total N	4225	3971	4017	3897	3894	3782	4083	4039

Conclusions

1. The crisis was hard hitting for nearly 70 percent of firms
2. The median firm experiencing a decline of 20 percent of revenue
3. Over 1/4 more firms reported revenue declines relative to firms in 2016
4. Firms experiencing declines in revenue were the primary takers of government aid (stark contrast to in f.ex USA)
5. Firms that took up aid report furloughing more and laying off fewer workers than they would have, absent government aid
6. However, the relationship varies with the kind of aid that firms take-up
7. We find a strong and clear relationship between taking up labour aid and reporting lower layoffs and more furloughs
8. The relationship for firms taking up cost aid is mixed, with lower layoffs but lower furloughs contingent on also taking on labour aid
9. Too early to detect the potential impact on liquidity, costs and survival, probably the goal of the fiscal aid subsidy -for future research