

# Covid and Productivity in Europe: A Responsiveness Perspective

by Cooper, Horn and Indraccolo

## Discussion



**Tibor Lalinsky**



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# Overall impression

- Focus on highly topical issues
- Original model-based approach
- Calibration reflecting actual data for 4 major EA countries
- Rich in content
- Several alternative and robustness analyses (difficult to address all in a short presentation)

How firms' responsiveness to unanticipated variations in profitability matters for the economy-wide response to aggregate shocks

More specifically:

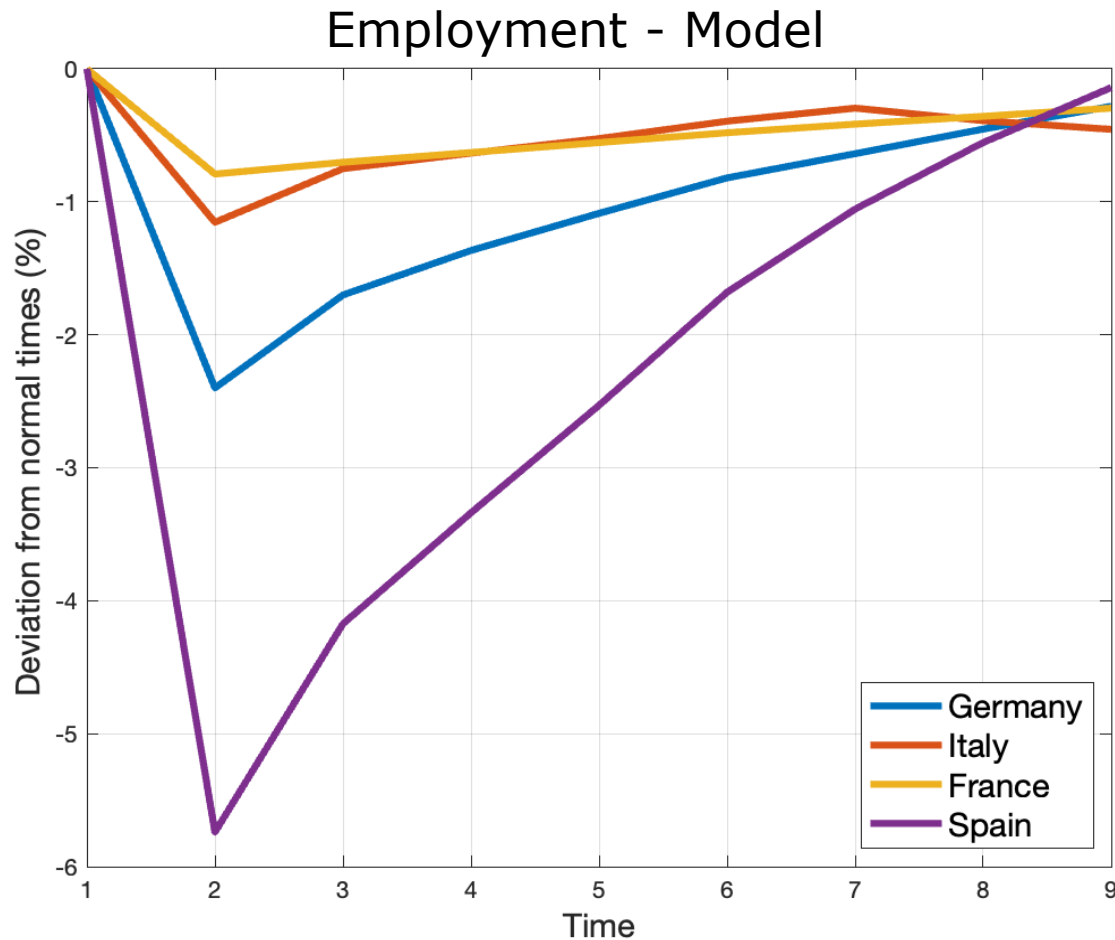
- Evidence on cross-country differences in responsiveness to profitability
- Focus on Covid-19 shock (and policy support)
- Response of employment, output and productivity (and also investments)

# Research approach

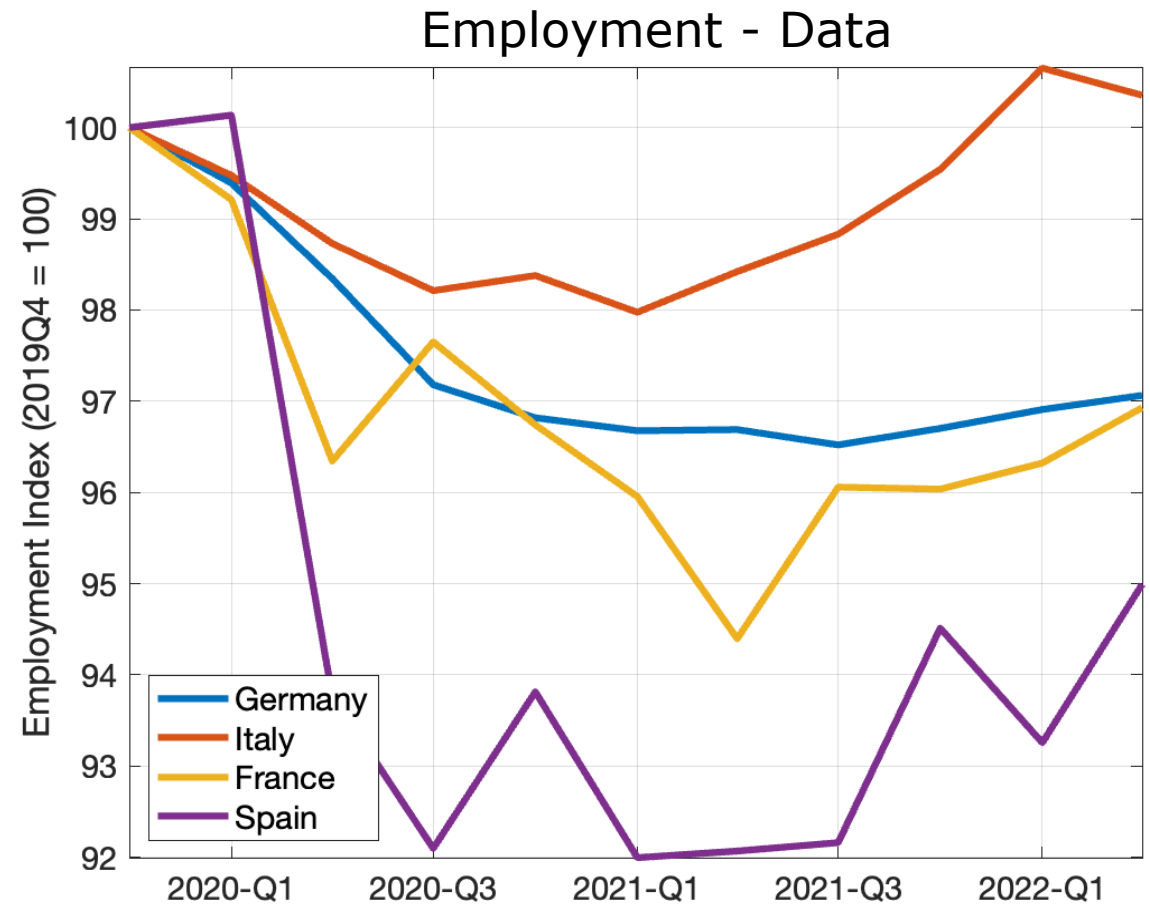
- 1) Estimate revenue function (to get innovation to profitability) and calculate firm employment responsiveness (to be included in the model as moments)
- 2) Estimate a partial equilibrium firm dynamic labor demand model for Germany, France, Italy and Spain
- 3) Explain cross-country differences in firms' responsiveness using the model
- 4) Extend the model and simulate the effects of Covid-19 shock and policy support on employment, firm exits, productivity and investments  
+ additional policy experiments (targeted policies and heterogeneous firm beliefs)

# The effect of Covid-19 on employment

- Employment response from -1% (France) to -6% (Spain)
- Response and (slow) recovery close to actual developments

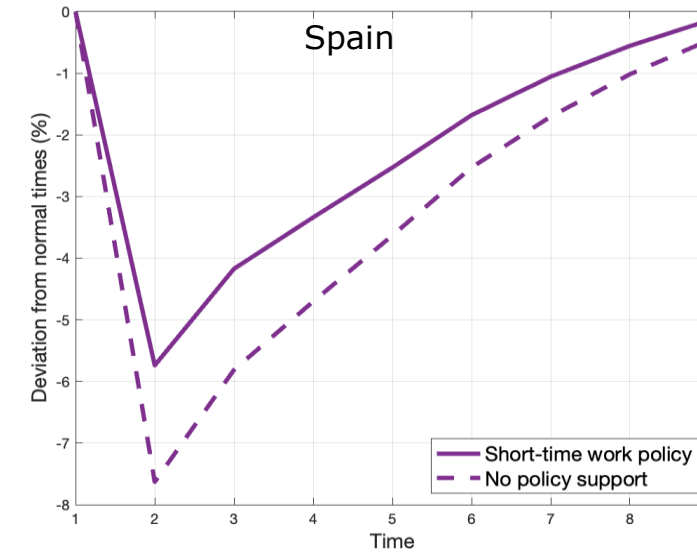
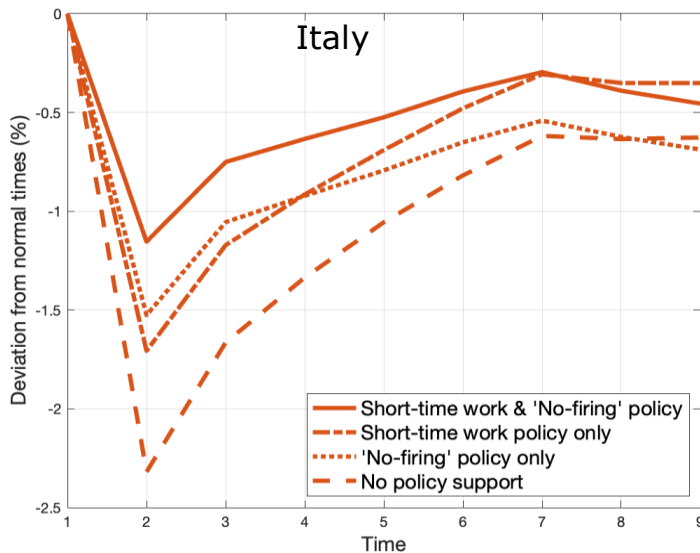
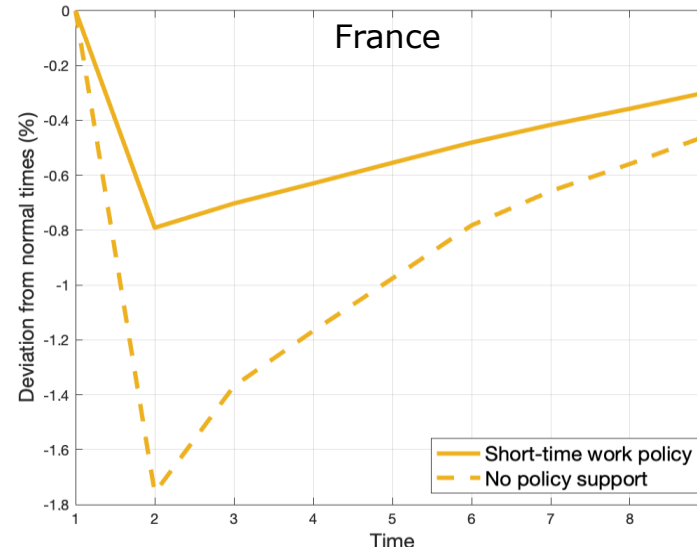
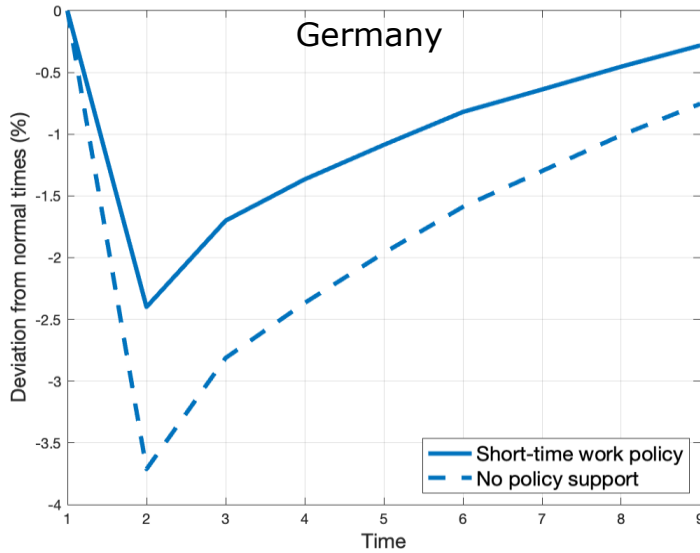


Source: Figure 2a) from the discussed paper.



Source: Figure 4b) from the discussed paper.

# The effect of support on employment



- ⇒ **The drop in employment would have been between 1.0 and 1.9 percentage points higher** without policy support
- ⇒ The largest nominal effect in Spain and the largest relative effect in Italy (with “No-firing”)

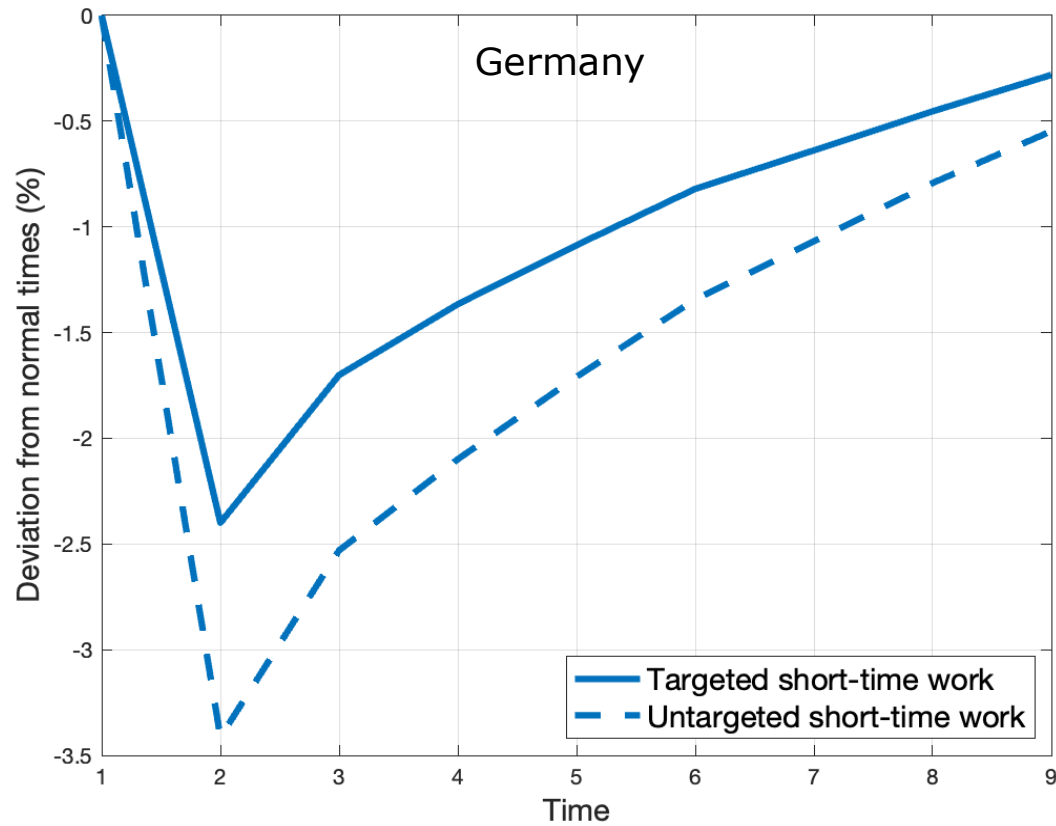
## ⇒ Close to other estimates:

- “support could save at least one percent of jobs” in Slovakia ([Lalinsky and Pal, 2022](#)),
- “euro area unemployment would have been 2.5pp higher” ([Ando et al., 2022](#))
- “unemployment rate was 2–4 percentage points lower” in Estonia ([Meriküll and Paulus, 2023](#))

# The effect of support on employment

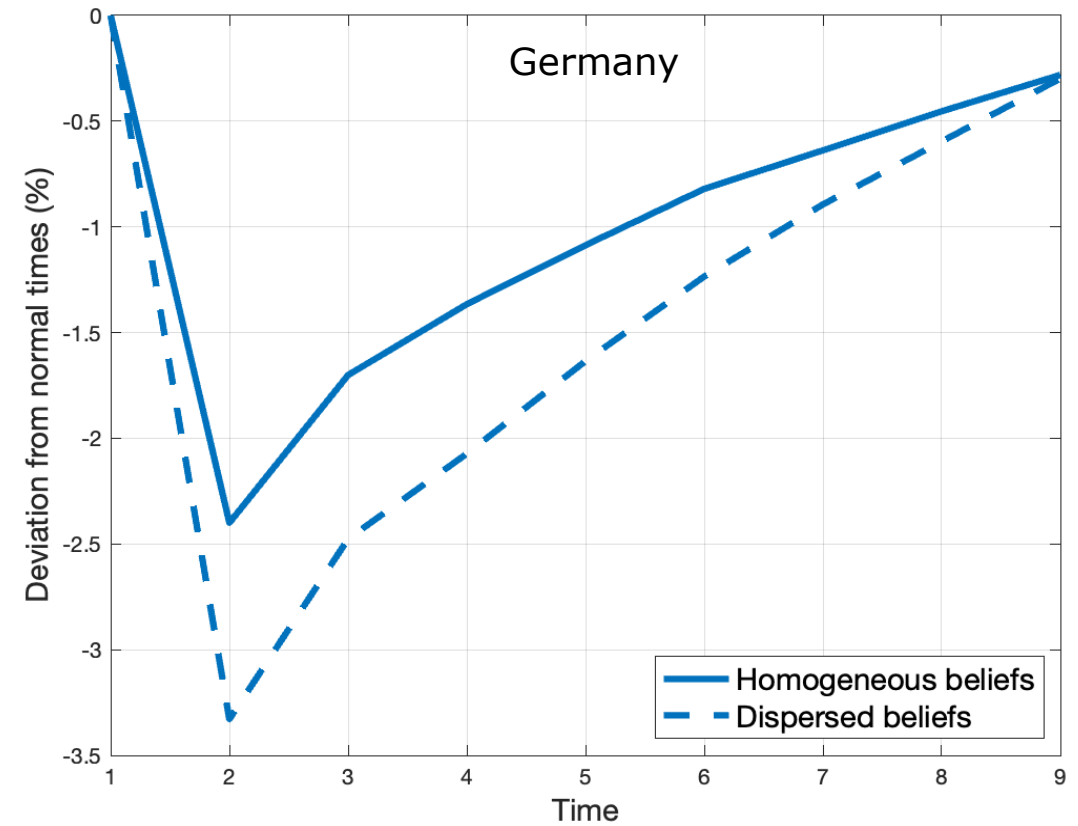
- Targeted support and homogenous beliefs are more effective in offsetting the adverse effects of the shock

Role of targeted support



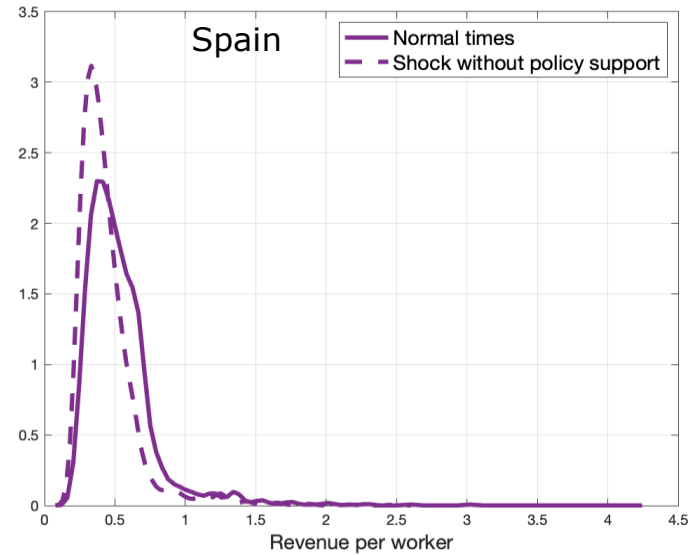
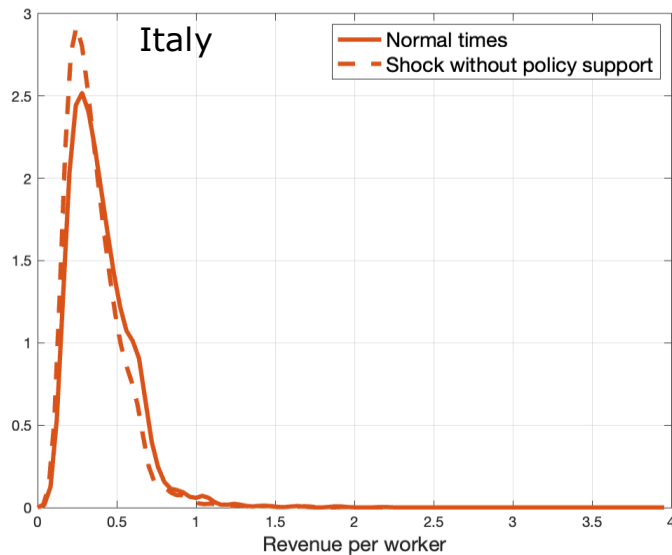
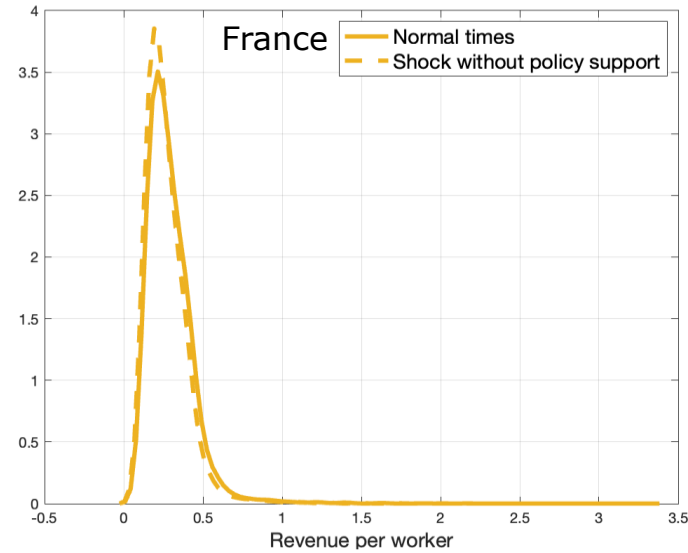
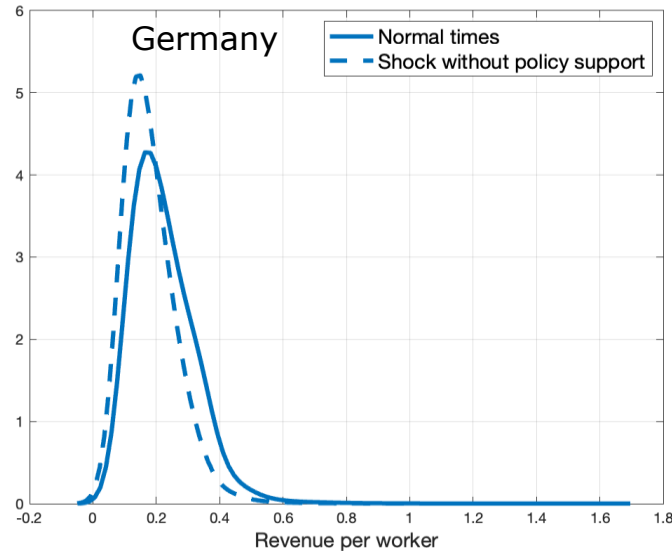
Source: Figure 14a) from the discussed paper.

Role of homogenous beliefs



Source: Figure 18a) from the discussed paper.

# The effect of Covid-19 on productivity



⇒ The Covid-19 pandemic reduced firm productivity and shifted the distribution to the left

Source: Figure 6 and Figure D1 from the discussed paper.



# The effect of Covid-19 on productivity

- Decline in aggregate productivity in all four countries
- No effect of the policy support on aggregate productivity

## Estimated aggregate productivity

		Normal times	Covid-19 shock: without support	Covid-19 shock: targeted support	Covid-19 shock: untargeted support
Germany	APL	0.211	0.169	0.168	0.169
	Std	0.098	0.079	0.079	0.079
France	APL	0.283	0.258	0.257	0.258
	Std	0.151	0.138	0.139	0.137
Italy	APL	0.384	0.339	0.336	0.337
	Std	0.201	0.179	0.179	0.179
Spain	APL	0.491	0.400	0.395	0.397
	Std	0.263	0.214	0.215	0.214

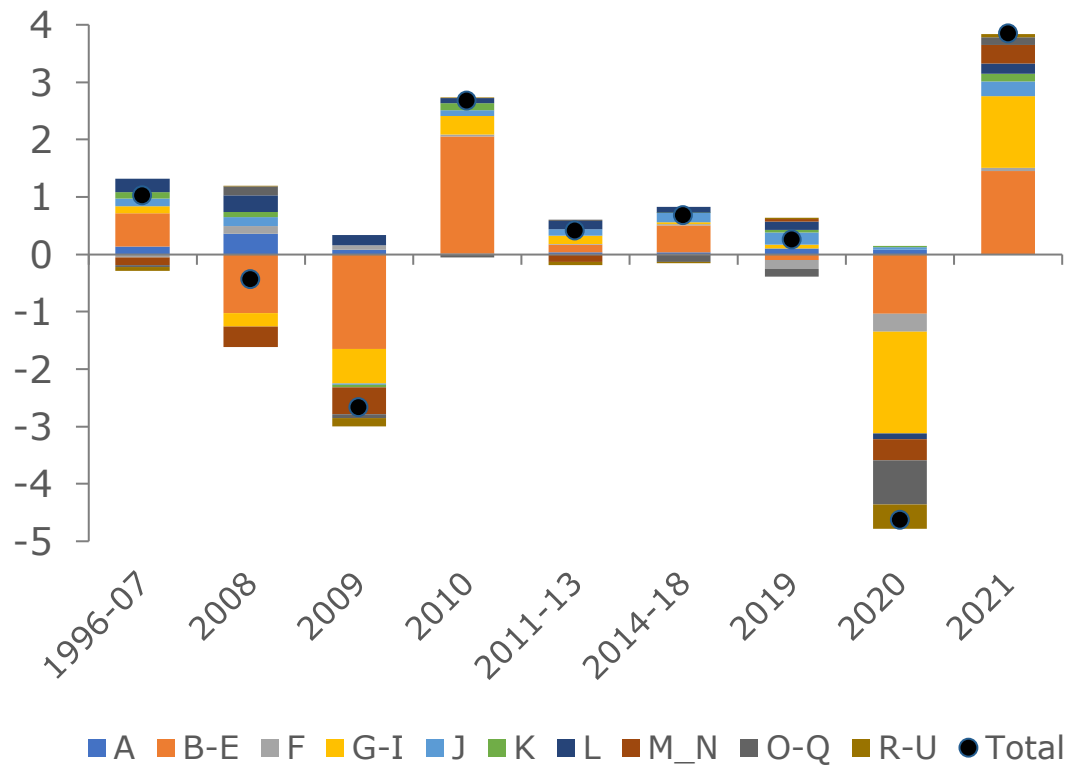
Source: Table 12 and Table D1 from the discussed paper.

- Lowest productivity in Germany and highest in Spain?
- Largest relative productivity decline in DE and smallest in FR?
- How much does the definition of productivity matter?

# The effect of Covid-19 on productivity

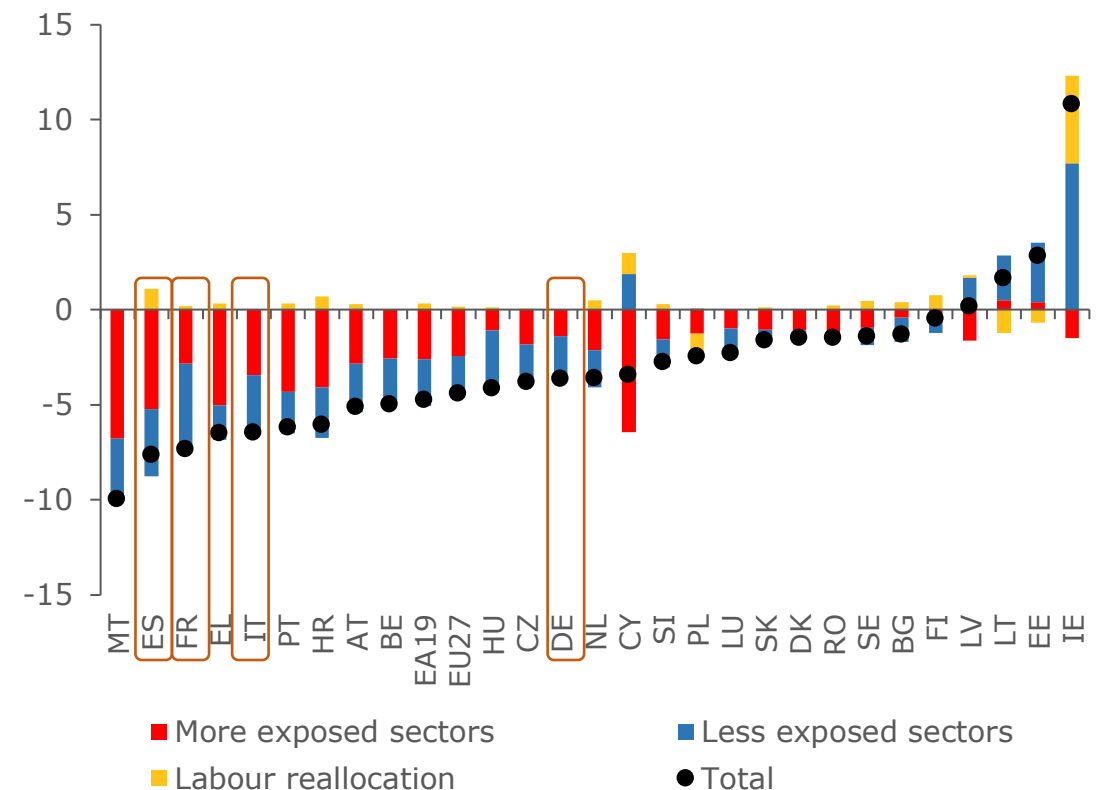
- The role of manufacturing sector changes and aggregate productivity developments vary across countries

Sectoral contributions to productivity growth (EA, percentage points)



Source: ESCB Expert Group on Productivity, Lalinsky et al. 2023.

Growth in productivity per employee by country (annual percentage change, 2020)



Source: ESCB Expert Group on Productivity, Lalinsky et al. 2023.

# Responsiveness to profitability

		Revenue Function			Responsiveness			Exit	$\mathcal{L}$
		$\tilde{\alpha}$	$\tilde{\rho}$	$\tilde{\sigma}_\eta$	$\beta_1^{int}$	$\beta_2^{int}$	$\beta_1^{ext}$	$\xi$	
France	Data	1.040	0.920	0.301	0.343 <sup>1</sup>	0.255	-0.005	0.698	
	Model	0.917	0.900	0.159	0.242 <sup>3</sup>	0.052	-0.005	0.381	1.168
Germany	Data	1.012	0.926	0.299	0.168 <sup>4</sup>	0.053	0.021	0.210	
	Model	0.920	0.924	0.134	0.217 <sup>4</sup>	0.050	0.019	0.277	0.505
Italy	Data	1.042	0.870	0.365	0.242 <sup>3</sup>	0.022	0.002	0.882	
	Model	0.943	0.896	0.144	0.291 <sup>2</sup>	0.023	0.002	0.344	0.793
Spain	Data	1.091	0.885	0.352	0.300 <sup>2</sup>	0.054	0.019	1.442	
	Model	0.900	0.882	0.141	0.323 <sup>1</sup>	0.051	0.019	0.575	0.760

- Do dispersion, size of the coefficients and their order matter for the effect of the shock?

*Notes* — The moments here are:  $\tilde{\alpha}$  = curvate of revenue function estimated via OLS,  $\tilde{\rho}$  = persistence of idiosyncratic profitability shock obtained from the OLS revenue function estimation and assuming that idiosyncratic profitability shocks evolve according to an AR(1),  $\tilde{\sigma}_\eta$  = standard deviation of profitability innovations  $\eta$ ,  $(\beta_1^{int}, \beta_2^{int}, \beta_1^{ext})$  = responsiveness regression coefficients,  $\xi$  = employment-weighted exit rate. “ $\mathcal{L}$ ” refers to the minimum distance between data and simulated moments achieved in the estimation.

# Responsiveness to productivity

- Somewhat higher differences in responsiveness across countries and increased responsiveness during the economic downturn

Firm-level employment growth with respect to productivity (Productivity-enhancing reallocation)

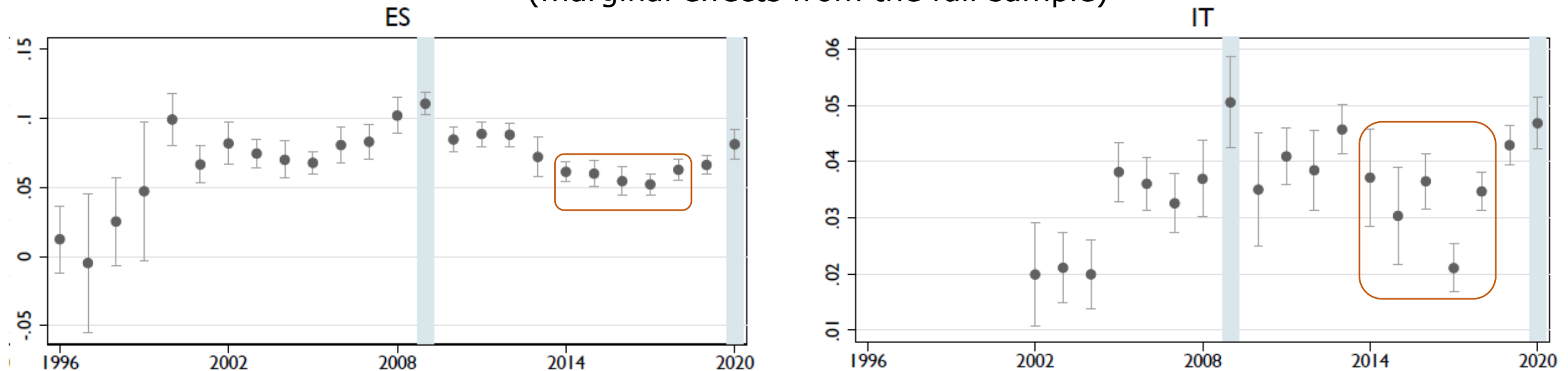
	EE	ES	FI	FR	GR <sup>1</sup>	HR	IT	LV	NL	PT	SI	SK
<b>Relative productivity</b>	<b>0.039***</b>	<b>0.062***</b>	<b>0.054***</b>	<b>0.012***</b>	<b>0.103***</b>	<b>0.044***</b>	<b>0.031***</b>	<b>0.050***</b>	<b>0.050***</b>	<b>0.039***</b>	<b>0.072***</b>	<b>0.038***</b>
	(0.002)	(0.006)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.010)	(0.006)	(0.006)	(0.002)
<b>Cycle</b>	<b>-2.714***</b>	<b>-3.904***</b>	<b>0.079</b>	<b>-1.793*</b>	<b>-0.036*</b>	<b>-0.236</b>	<b>0.083</b>	<b>-4.057***</b>	<b>0.788</b>	<b>-4.841***</b>	<b>0.764</b>	<b>-0.178</b>
	(0.176)	(0.192)	(0.382)	(1.059)	(0.017)	(0.186)	(0.168)	(0.296)	(1.070)	(0.303)	(1.118)	(0.341)
<b>Relative productivity #Cycle</b>	<b>0.292</b>	<b>0.772**</b>	<b>1.019***</b>	<b>-0.420</b>	<b>-0.034</b>	<b>0.143</b>	<b>-0.268</b>	<b>0.565*</b>	<b>1.729*</b>	<b>0.346</b>	<b>2.377***</b>	<b>0.527**</b>
	(0.200)	(0.309)	(0.324)	(0.506)	(0.042)	(0.120)	(0.239)	(0.330)	(0.970)	(0.407)	(0.600)	(0.237)
<i>N</i>	87252	843984	265014	538308	538308	182826	1314083	127584	436933	661692	121534	202770
<i>R</i> <sup>2</sup>	0.064	0.096	0.060	0.038	0.158	0.062	0.048	0.062	0.057	0.044	0.087	0.085

Notes: OLS estimates with firm-level employment growth as dependent variable, relative within-sector value added labour productivity and regional unemployment-based cycle as explanatory variables. Industry and year fixed effects included, but not presented. Estimates weighted by the firm's average employment over the whole sample period. Robust standard errors in parentheses, \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

# Responsiveness to productivity

- Relatively low responsiveness during the (model) baseline period

Productivity-enhancing reallocation by sample years  
(marginal effects from the full sample)



Notes: The figure plots the marginal effects of an increase of one unit in relative productivity in each sample year. The economic cycle is proxied by year dummies instead of regional unemployment for this specification and each marginal effect shows the sensitivity of employment growth at the firm to its lagged productivity in a particular year.

Source: ESCB Expert Group on Productivity, Lalinsky, Lopez-Garcia and Meriküll (2023).

## ➤ Covid-19 shock, policy support and revenue adjustments

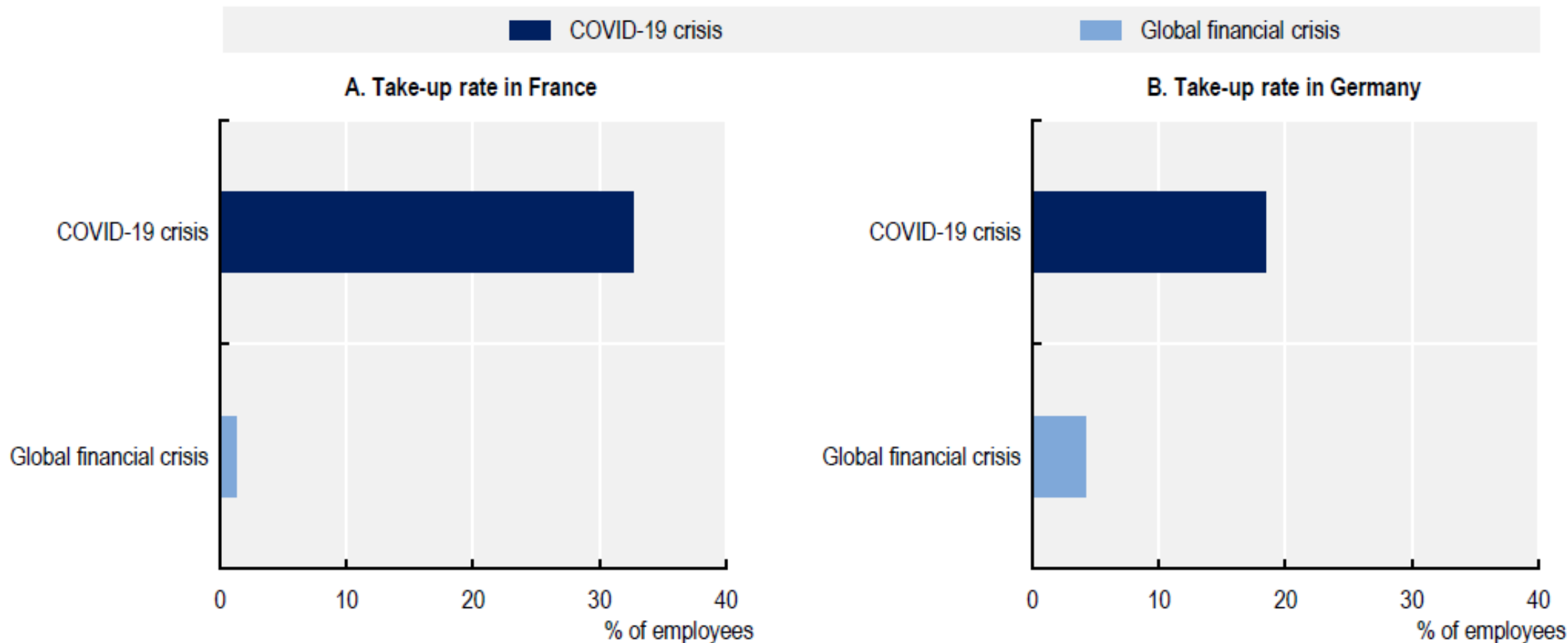
	Fraction STW (%)	Hours sharing (%)	Employment drop			$\lambda$
			Data	Model	Fit	
Germany	15.8	28.1	-2.40	-2.40	3.719e-06	0.79
France	14.0	31.0	-0.79	-0.79	2.123e-06	0.90
Italy	57.2	13.0	-1.10	-1.11	2.046e-04	0.87
Spain	38.0	24.1	-5.71	-5.73	7.431e-04	0.79

*Notes* — For this table, “Fraction STW (%)” refers to the fraction of firms making use of short-time work during the Covid-19 crisis. “Hours sharing (%)” refers to the average fraction by which firms reduced hours worked. See Appendix section G for data sources.

Source: Table 8 from the discussed paper.

# Take-up rates of job retention schemes

- Higher use of support as the percentage of dependent employees

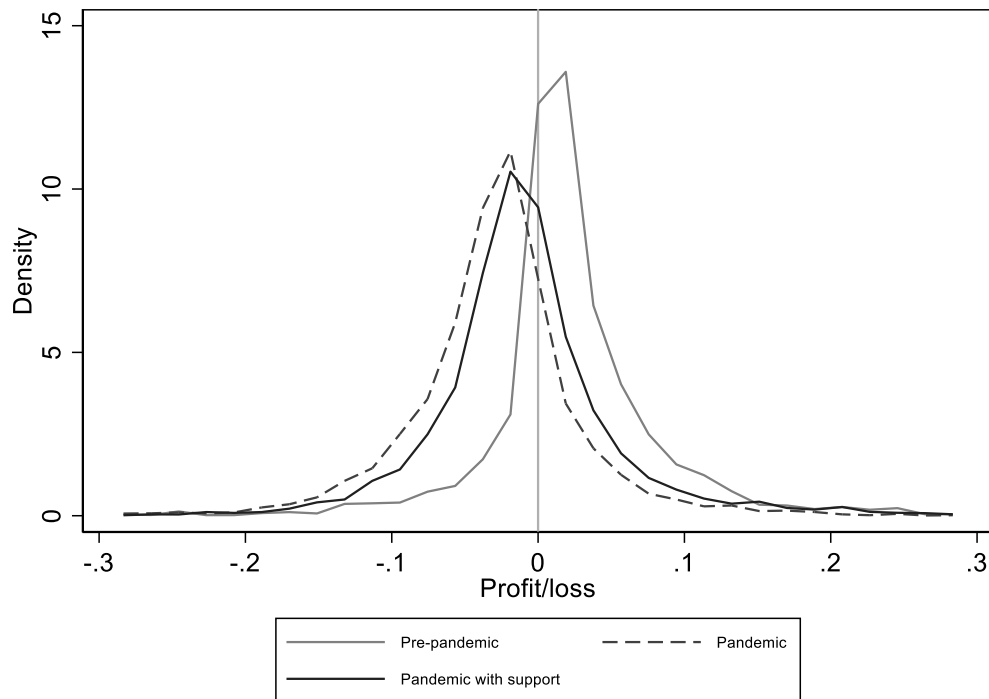


Source: [OECD \(2020\)](#).

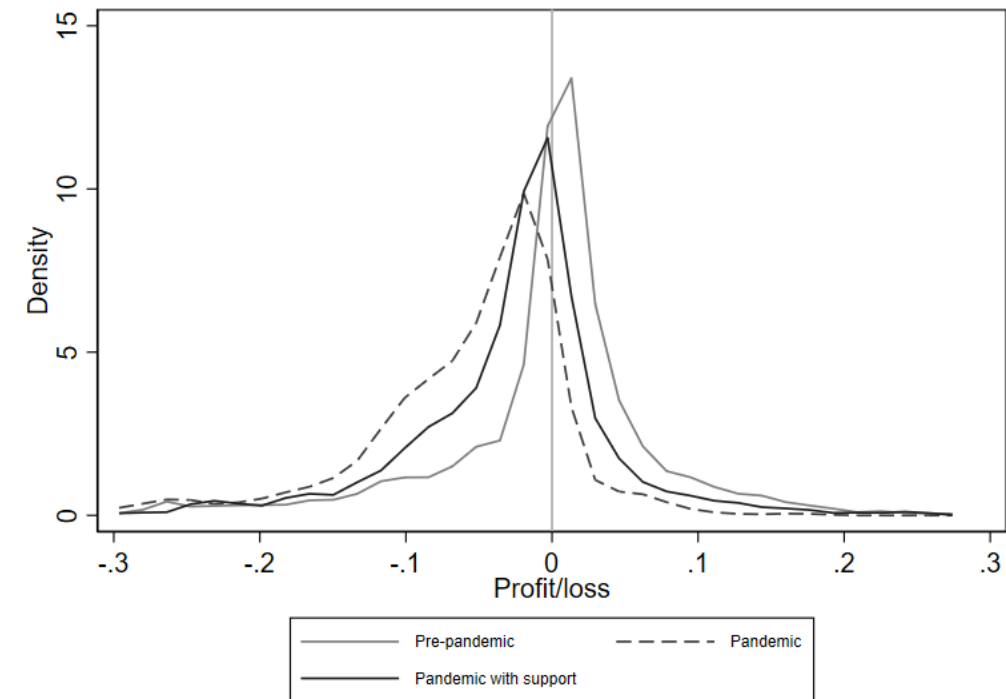
# The effect of the policy support

- Not only the effect of pandemic, but also the effect of policy support differs across firms and industries

## Manufacturing



## Accommodation\_and\_food\_service



Note: Distribution of profits before the pandemic, during the pandemic and with support (supported firms only). Pandemic profit with support is the sum of the estimated firm pandemic profit and actual individual employment support from the first wave of the pandemic.

Source: [Lalinsky and Pal \(2022\)](#).



# Distribution of employment support

- The assumption of Covid-19 support targeting low profitable (or low productive) firms may not necessarily be valid (the eligibility was primarily based on drop in revenue)
- Productive firms received most of the subsidies and had higher probability to be supported (although with lower relative support)

## Allocation of support to selected firm clusters

Cluster	Croatia	Netherlands	Slovakia	Slovenia
<b>High productive</b>	<b>33.9</b>	<b>32.2</b>	<b>32.2</b>	<b>30.2</b>
Low Productive	7.0	21.6	5.8	9.7
Young and productive	2.8	1.4	1.1	1.3
Zombie	3.5	3.7	4.6	2.4
High-tech	15.6	41.1	32.7	22.6
Low-tech	76.2	55.4	61.9	70.9
Growing	16.3	12.6	10.9	12.4
Declining	2.5	0.9	3.0	3.2

Note: Share of employment support allocated to firms from the selected clusters (in % of overall employment support).

Source: [Bighelli et al. \(2023\)](#).

## Probability of receiving support by productivity

Variables	Croatia	Netherlands	Slovakia	Slovenia
<b>Labour productivity</b>	<b>0.0202***</b>	<b>-0.0690***</b>	<b>0.0213***</b>	<b>-0.0673***</b>
	<b>(0.0020)</b>	<b>(0.0019)</b>	<b>(0.0013)</b>	<b>(0.0045)</b>
Control variables:				
Sector	Yes	Yes	Yes	Yes
Size class	Yes	Yes	Yes	Yes
Observations	71,180	99,925	76,005	30,701

Note: Average marginal effects from the logit regression for binary dummy representing receipt of COVID-19 employment support.

Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: [Bighelli et al. \(2023\)](#).

- Is the policy support without “no firing” condition realistic assumption? (Firms probably need to keep at least the supported workers for the time of receiving support.)
- Missing description of the Orbis data used for calibration
- Space for discussion of the results with respect to findings published in other Covid-19 related papers
- Not always clear terminology (Despite simplified model approach, some words probably cannot be used interchangeably: revenue per worker vs. TFPR, low profitability vs. low-productive firms, share of supported firms vs. share of supported workers)
- Figures: consider common y-axis scale for easier comparison of the size of the effects across countries

[Ando, S. et al. \(2022\), “European Labor Markets and the COVID-19 Pandemic Fallout and the Path Ahead”, Departmental Paper Series, No. 2022/0004, European Department, International Monetary Fund.](#)

[Lalinsky and Pal \(2022\), “Distribution of COVID-19 government support and its consequences for firm liquidity and solvency”, Structural Change and Economic Dynamics, Elsevier, vol. 61\(C\), pages 305–335.](#)

[OECD \(2020\), “Job retention schemes during the COVID-19 lockdown and beyond”, OECD Policy Responses to Coronavirus \(COVID-19\), OECD Publishing, Paris.](#)

[Bighelli et al. \(2023\), “Cross-country evidence on the allocation of COVID-19 government subsidies and consequences for productivity”, Journal of the Japanese and International Economies, Elsevier, vol. 68\(C\).](#)

Lalinsky, Anastasatou, Anyfantaki, Benkovskis, Bergeaud, Bun, Bunel, Colciago, De Mulder, Fantino, Gonzalez, Jarvis, Khametshin, Kolaiti, Krasnopjorovs, Lebastard, Lopez-Garcia, Martins, Meinen, Meriküll, Parker, Raos, Selebaj, Serafini, Szörfi, Vanhala, Vaňko and Volk (2023), “The impact of the COVID-19 Pandemic and policy support on productivity”, ECB Occasional paper, forthcoming.

Lalinsky, Lopez-Garcia and Meriküll (2023), “Productivity enhancing reallocation”, mimeo.

[Meriküll and Paulus \(2023\), “The impact of the Covid-19 job retention support on employment”, Economics Letters, 222, 110963.](#)