Productivity and responses to the pandemic:
firm-level evidence

Péter Harasztosi & Simon Savšek*

28 April 2022

Menu for today

1. Motivation

2. Data and empirical strategy

3. Results

4. Conclusion and policy considerations

Interested in what happens to firm-level productivity once the pandemic hit – no clear cut answer

▶ From a theoretical standpoint, shifts in productivity very likely.

▶ Fuentes & Moder (2021) argue that the pandemic could affect total factor productivity in several ways.

initially lock resources in unproductive sectors,

slowing down the reallocation of resources,

lower spending on R&D,

reshoring of global value chains

acceleration of digitalization,

green transformation,

innovations

managerial practices

▶ All in all, an interesting empirical question

On top, inconclusive literature

▸ Andrews et al. (2021) show that labour turnover declined in response to the pandemic for three countries of the OECD. On the other hand, firms that intensively used Apps to manage their business were more resilient, strengthening the case for the digitalization

▸ Lamorgese et al. (2021) find a sizable, positive effect of management practices on firm performance for Italian companies. It seems that better-managed firms were able to implement important organizational changes, including remote work.

▸ Kozeniauskas et al (2020); heterogeneous responses of Portuguese firms. Most of the firms experienced declines in sales, but high productivity firms were more likely to remain open, less likely to lay off employees and used government support to a lesser extent.

▸ Apedo-Amah et al. (2020), using Enterprise survey, confirm the severe impacts of the pandemic on enterprises with a persistent negative impact on sales. As regards the labour adjustment, authors find that the adjustment on the intensive margin has been much stronger. Importantly, authors state that:

"productivity growth could be an especially important channel to analyse as the crisis could effectively impair productivity growth through different mechanisms, by reducing incentives or resources for investment in innovation as well as by worsening misallocation of resources between firms and sectors."

Data

▸ Analysis builds on the World Bank Enterprise Survey (ES) datasets.

▸ Primary sources of information are the COVID-19 follow-up questionnaires conducted in 2020 and in 2021.

▸ These surveyed the same firms engaged in the general modules of 2018 and 2019 Enterprise Surveys and come in several waves. We merge the two sets of information at the enterprise level and also capitalize on the information from the World Bank Productivity dataset (see Francis et al. 2020) that was constructed for the same enterprises.

▸ All in all: 18,765 firms from 32 countries (5 Western Balkans, including North Macedonia). Out of these, 13,791 firms were interviewed again in the first wave of the Covid-19 follow-up surveys. In 22 countries, the second or even a third wave of surveys are available, allowing us to collect additional information on 9,173 and 3,873 firms, respectively.

▸ Sectors: Manufacturing (15-37), Construction (45), Wholesale and retail (50, 51 and 52), Hotels and restaurants (52 and 55), Transport (60-63) and other services including Telecommunication, IT and Computer services (64 and 72).

Timing
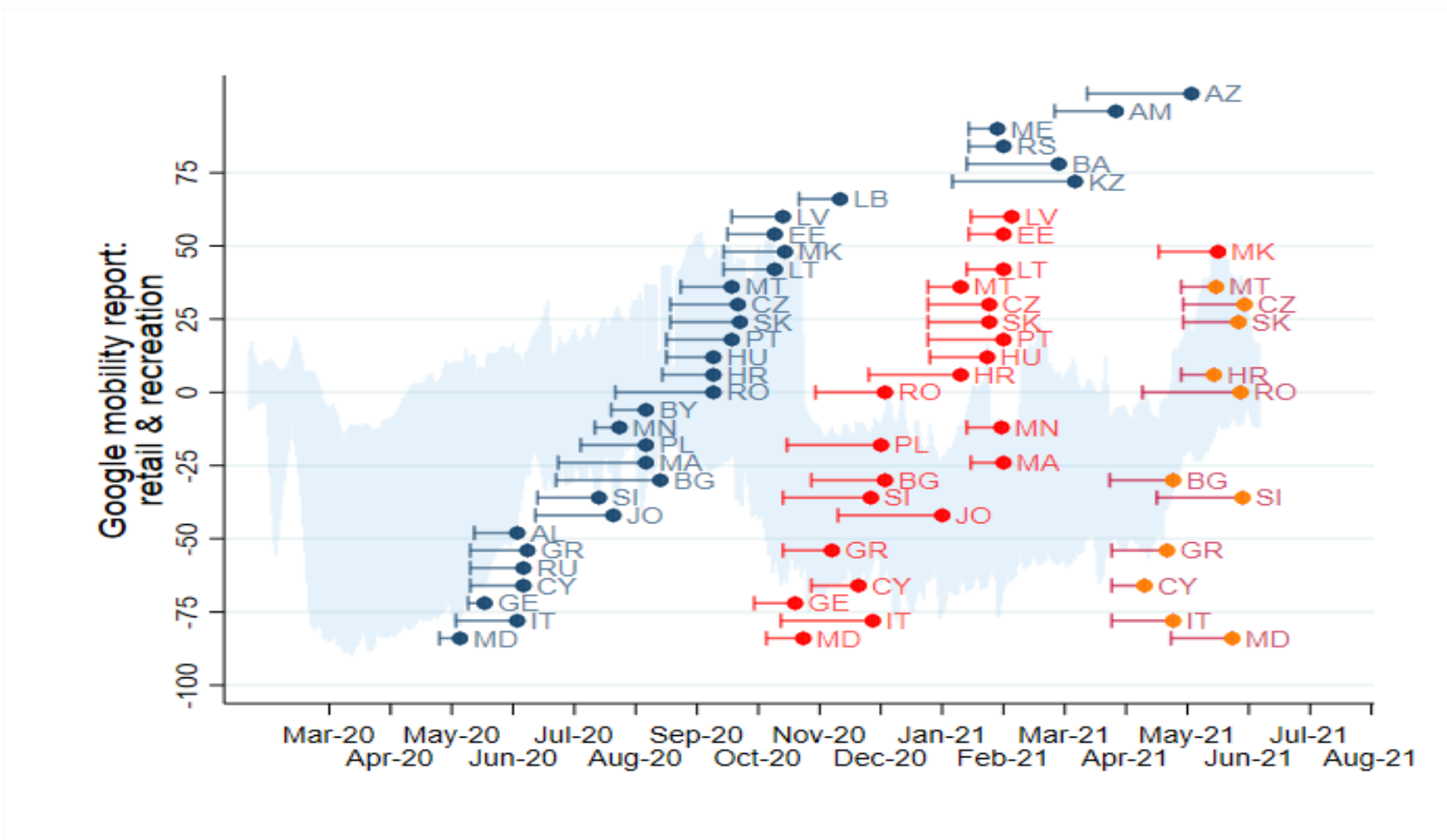
Note: Figure shows the interval between the first and the last COVID-19 follow up interviews by country in horizontal bars. The figure, on its y-axis shows the values of Google mobility index time-series for all countries in the surveys, where the mobility index is available.

Productivity measures

▸ Labour productivity

▸ TFP

▸ Real sales/employee – our chosen one

Figure: The share firms with missing labour productivity or TFP by sales over employment
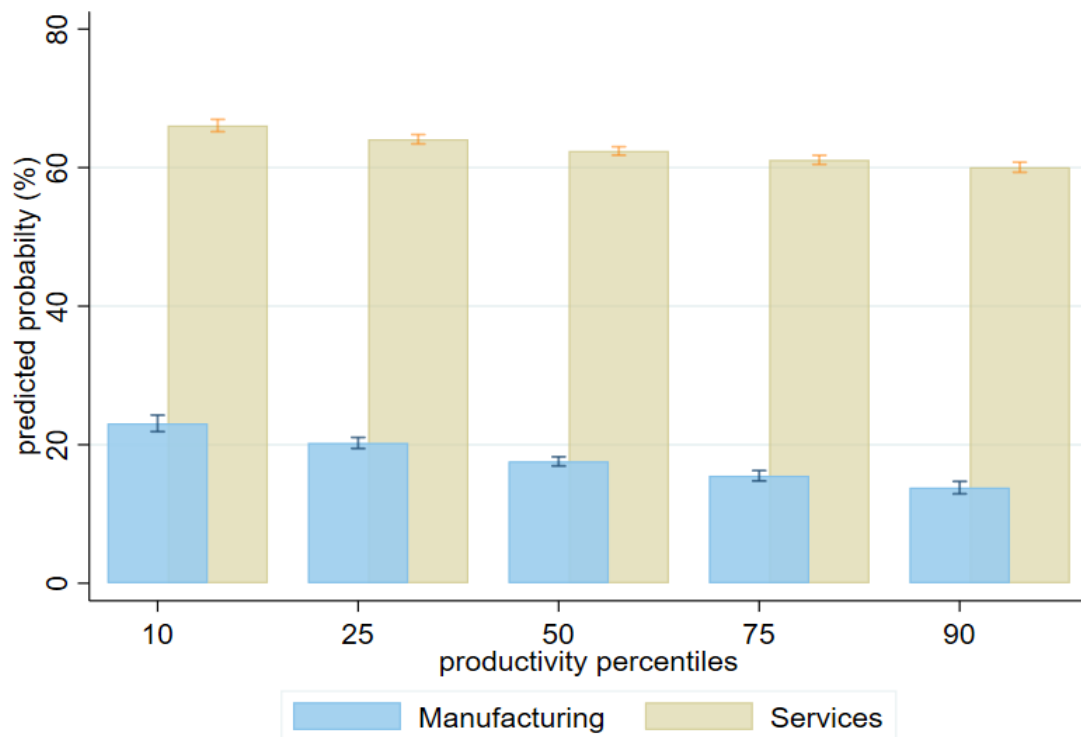
Note: The figure shows the share of firms by the percentile values of sales over employment that have no labour productivity measure (services sector) or no total factor manufacturing. The error bars correspond to a ten percent significance.

Some interesting descriptive statistics of our sample and dependent variables

- **Firm closures:** about 3% of the sample closed down permanently, 40% temporarily in manufacturing sectors, 45% in services

- **Losses in sales:** 64% suffered losses (y-o-y), about a third of sample losses greater than 30%

- **Change in supply and demand:** nearly 60% experienced loss in demand and 50% of them facing problems in their supplies

- **Employment response:** about 10% reduced employment permanently and a bit less than a third sent workers on unpaid leave

- **Remote work and online sales:** more than 30% increased remote working (sectoral heterogeneity), 24% of the firms increased online sales activity, a quarter increased or introduced the delivery of their products

- **Policy support:** cash transfers, deferral of credit and mortgage payments, access to new credit, fiscal exemption and wage subsidy investigated; wage subsidies mostly utilized (28%), subsidized credit was used much less frequently (7%).

European
Investment
Bank
The EU bank

Empirical strategy

$$Pr(Y_i = 1) = \beta PROD_i + \Gamma \boldsymbol{X_i} + \psi_c + \sigma_s$$

Y is a binary variable, describing the COVID-19 response of establishment i in country c and sector s. PROD is a measure of productivity and X is a vector of firm controls, ψ and σ represent country and sector fixed effects.

Eq. (1) estimated by taking into account that Enterprise survey is a stratified survey.

The predicted outcome probabilities at various percentiles of the productivity distribution are evaluated.

Important: No causal interpretation of results. Nevertheless, reverse causality can be ruled out. Productivity measure and control variables are not affected by the COVID-shock, because the dependent variable describes the establishment's behaviour in 2020 and 2021, while the independent variables are obtained from the surveys taken in 2018 and 2019.

European
Investment
Bank
The EU bank

Some results

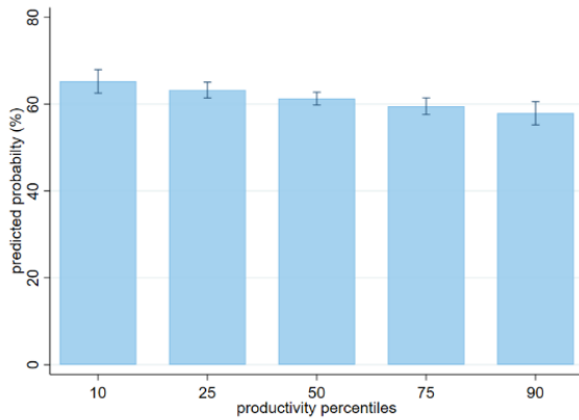## Predicted probability of permanent firm closure
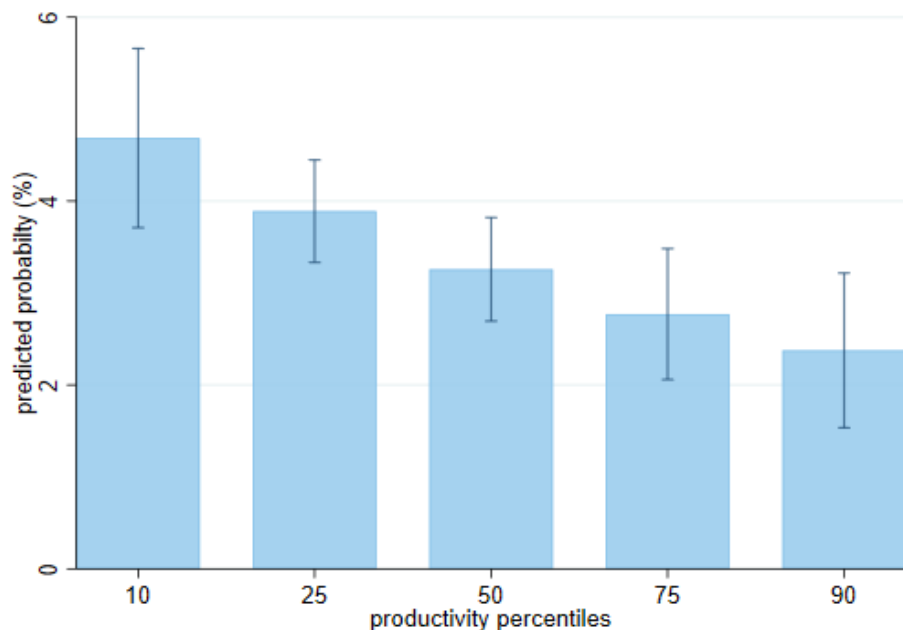
Note: The columns show the predicted share of firms that close down by productivity moments. The results are obtained from survey regressions on quintiles with pre-2020 weights of the Enterprise Survey. Regressions are derived from Eq. 1 and control for country and sector fixed effects and firm size, age, ownership and exporting status. Error bars correspond to 10 percent significance level

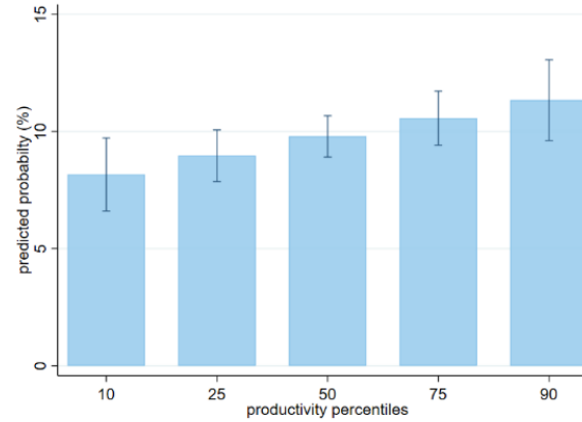## Predicted probability of bankruptcy and insolvency
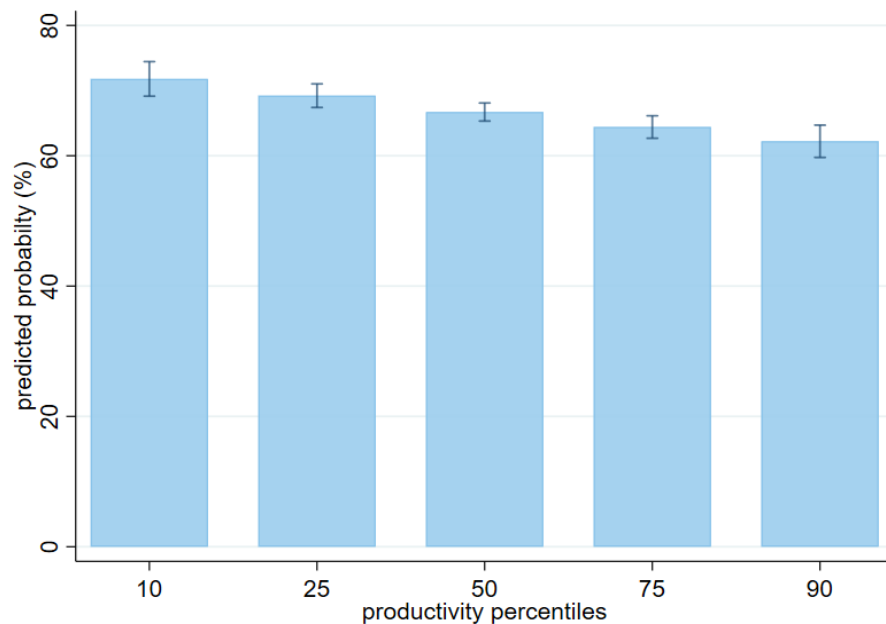
Note: The columns show the predicted share of firms that report sales losses by productivity moments. The results are obtained from survey regressions with COVID-19 Follow-up survey weights of the Enterprise Survey. Regressions are derived from Eq. 1 and control for country and sector fixed effects and firm size, age, ownership and exporting status. Error bars correspond to 10 percent significance level
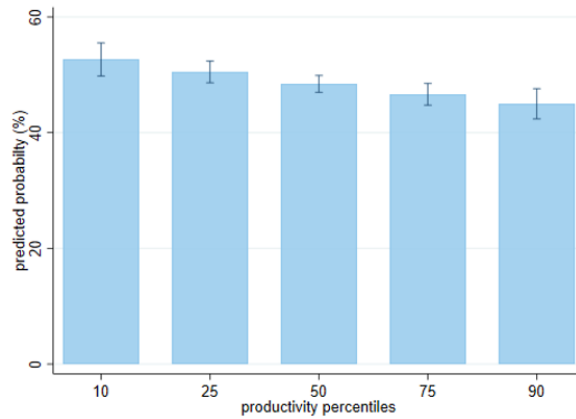
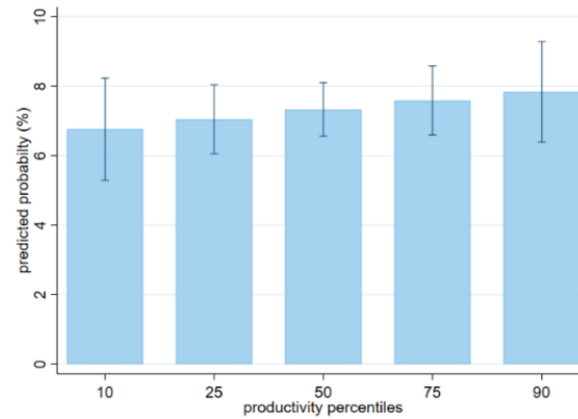# Predicted probability for change in demand or in the supply of inputs

(a) Decrease in demand

(b) Increase in demand

(c) Decrease in supply

(d) Increase in supply

Note: The columns show the predicted share of firms that report (a) decrease or (b) increase in demand for their product or services or that report (c) decrease by productivity moments. The results are obtained from survey regressions with COVID -19 Follow-up survey weights of the Enterprise Survey. Regressions are derived from Eq. 1 and control for country and sector fixed effects and firm size, age, ownership and exporting status. Error bars correspond to 10 percent significance level.

Predicted probability of employment layoff
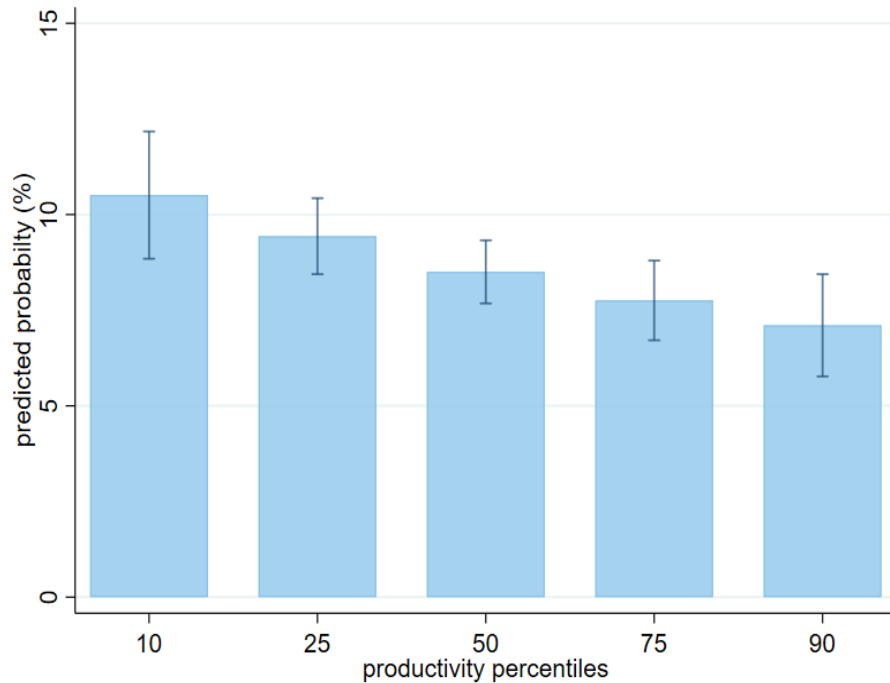
Predicted probability of reduction of working hours
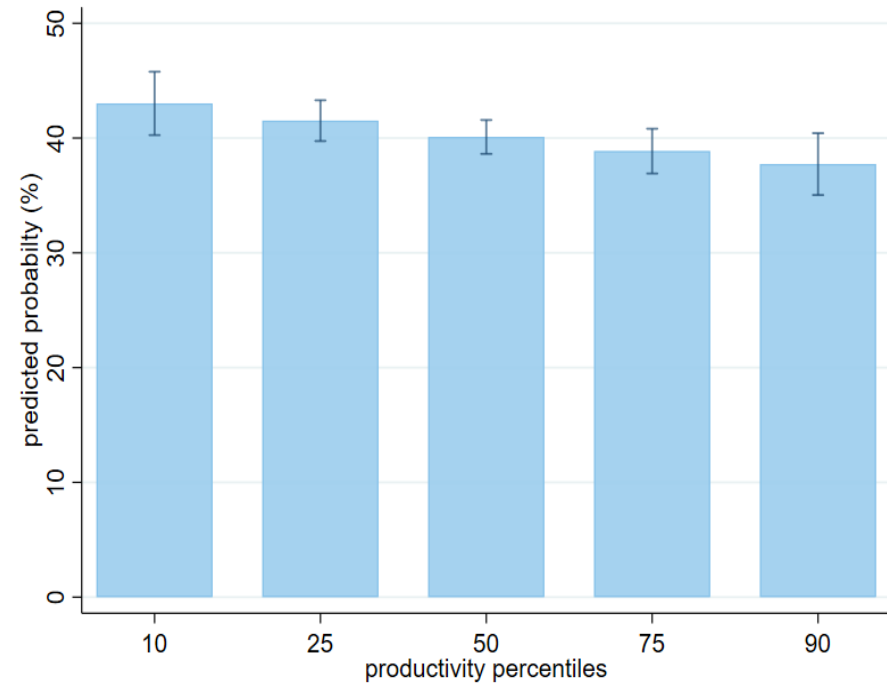
Note: The columns show the predicted share of firms that report employment layoff by productivity moments. The results are obtained from survey regressions with COVID-19 Follow-up survey weights of the Enterprise Survey. Regressions are derived from Eq. 1 and control for country and sector fixed effects and firm size, age, ownership and exporting status. Error bars correspond to 10 percent significance level.

Note: The columns show the predicted share of firms that report reducing the working hours by productivity moments. The results are obtained from survey regressions with COVID-19 Follow-up survey weights of the Enterprise Survey. Regressions are derived from Eq. 1 and control for country and sector fixed effects and firm size, age, ownership and exporting status. Error bars correspond to 10 percent significance level.

Introduction or increase of remote work by productivity
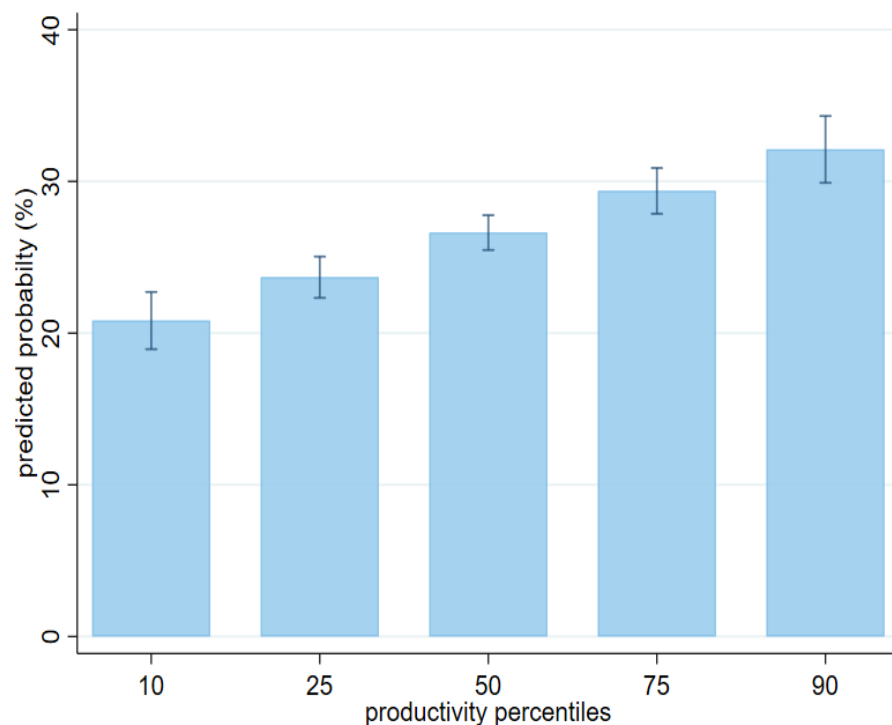
BUT **?**

Note: The columns show the predicted share of firms that report Introduction or increase of remote work by productivity. The results are obtained from survey regressions with COVID-19 Follow-up survey weights of the Enterprise Survey. Regressions are derived from Eq. 1 and control for country and sector fixed effects and firm size, age, ownership and exporting status. Error bars correspond to 10 percent significance level.
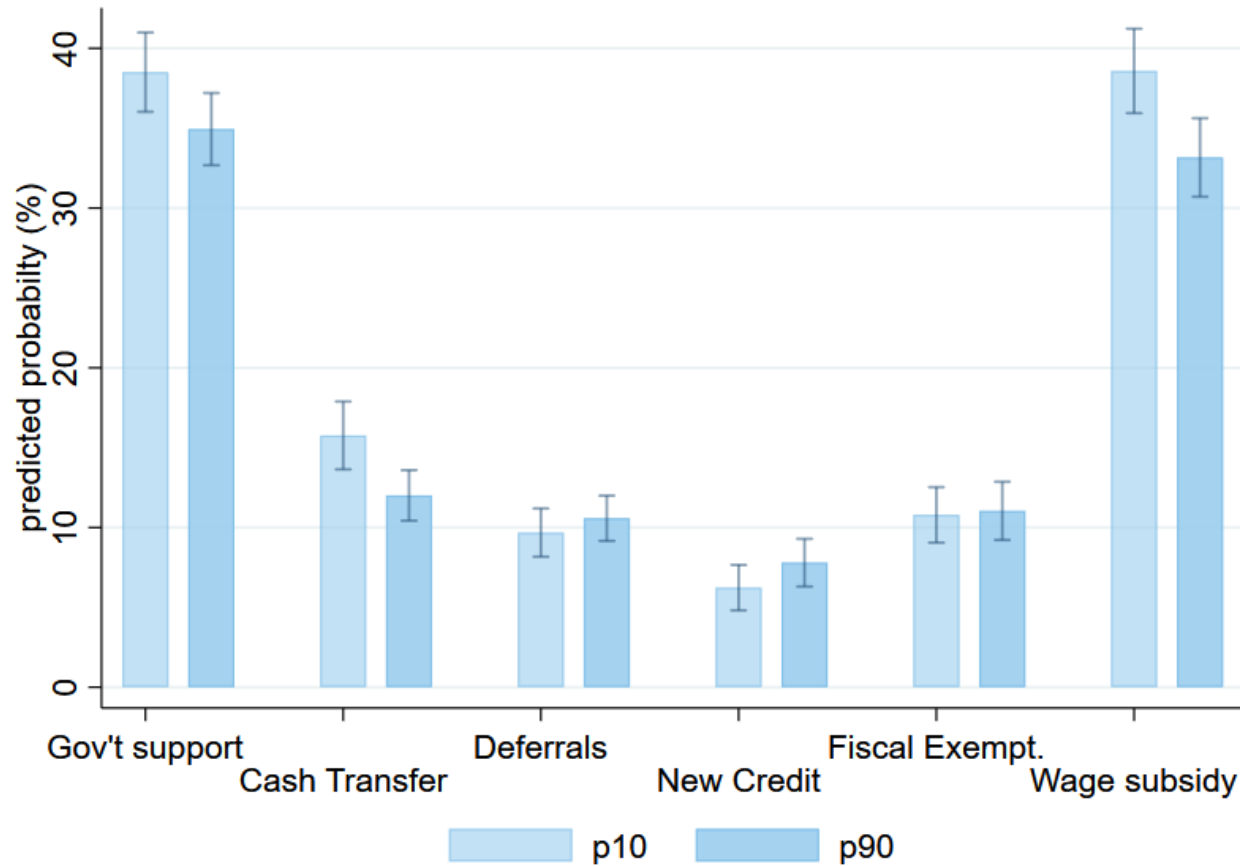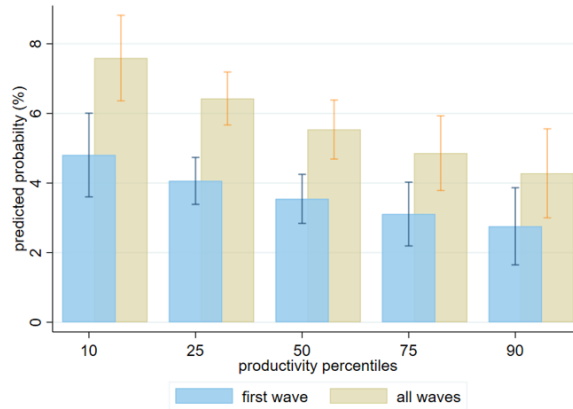
What about policy support?

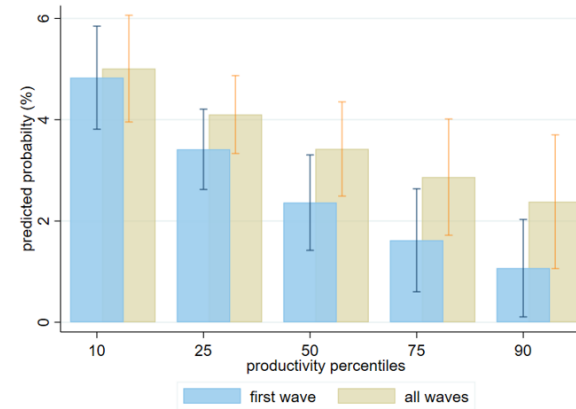Note: The columns show the predicted share of firms that report receiving policy measures. P10 and P90. The results are obtained from survey regressions with COVID-19 Follow-up survey weights of the Enterprise Survey. Regressions are derived from Eq. 1 and control for country and sector fixed effects and firm size, age, ownership and exporting status. Error bars correspond to 10 percent significance level.

Are we capturing only short term impact on productivity? Robustness

Panel (a): Permanent closure

Panel (b): Bankruptcy
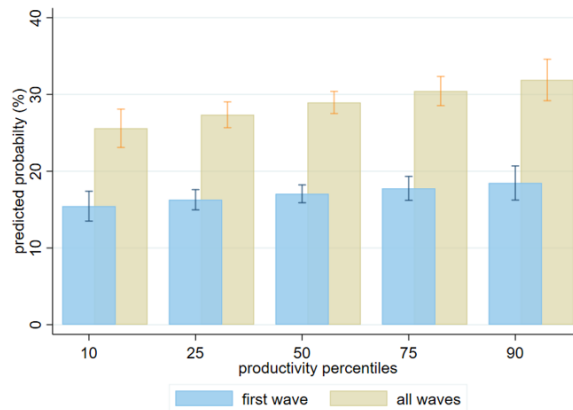
Panel (c): Online sales
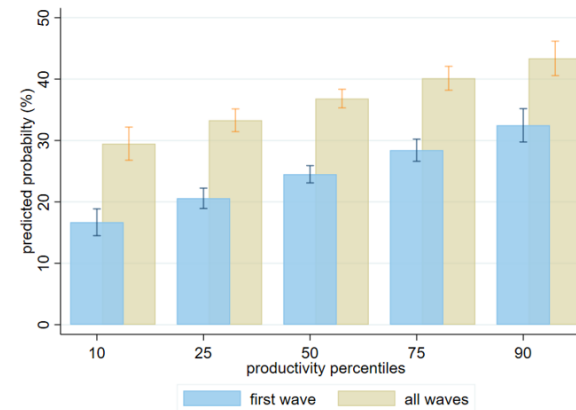
Panel (d): Remote working

Note: The columns show the predicted share of firms that close down permanently (panel a) or file for bankruptcy (panel b), the share of firms that report Introduction or increase of online sales (panel c) and remote work (panel d) by productivity. The results are obtained from survey regressions with COVID-19 Follow-up survey weights of the Enterprise Survey. Regressions are derived from Eq. 1 and control for country and sector fixed effects and firm size, age, ownership and exporting status. Error bars correspond to 10 percent significance level.

Summary of the results and discussion

▸ The pandemic had very strong and heterogeneous impact across sectors.

▸ More productive firms coped with the crisis better in terms of closures and employment adjustments.

▸ They were more likely to speed up some digitalization processes.

▸ The recent crisis could amplify the difference between highly productive and less productive firms.

▸ As regards the governments' policy measures, we find strong utilization at the firm level, but very little differentiation across productivity quantiles

▸ More targeted approach in the current crisis?

Thank you

European
Investment
Bank

The EU bank

Table 2. Description of variables

	N	mean	min	max	sd
PANEL A:					
Productivity (sales/employment in logs)	11990	10.47	3.43	17.52	1.36
Labour productivity (value added/empl. in logs)	6739	9.89	-3	15.49	1.3
Total factor productivity	4275	3.08	-1.35	11.17	1.91
PANEL B:					
Indicator variables for firm size:					
small (<20)	13791	45	0	100	50
medium (20-99)	13791	34	0	100	47
large (100 and over)	13791	21	0	100	41
firm age (in logs)	13570	2.76	0	5.09	0.74
Indicator: exporter	13581	22.88	0	100	42.01
Indicator: foreign ownership	13564	8.95	0	100	28.55
PANEL C:					
Indicator variables for COVID-19 response					
permanent closure	18765	3.38	0	100	18.07
temporary closure	13776	41.23	0	100	49.23
drop in yoy sales	12731	64.39	0	100	47.89
drop in yoy sales more than 30%	12731	34.86	0	100	47.65
filed for bankruptcy or insolvency	13791	2.28	0	100	14.94
decreased demand for product / services	13425	59.34	0	100	49.12
increased demand for product / services	13425	10.21	0	100	30.28
decreased supply of materials	13425	49.82	0	100	50
increased supply of materials	13425	8.23	0	100	27.48
firm converted product or services	13789	33.58	0	100	47.23
decrease of working hours	13425	39.86	0	100	48.96
employment layoff	13791	10.19	0	100	30.25
employment unpaid leave	13791	26.2	0	100	43.97
increased or introduced remote work	13791	31.96	0	100	46.63
increased or introduced online sales	13791	23.99	0	100	42.71
increased or introduced delivery	13791	21.09	0	100	40.8
PANEL D:					
Indicator variables for Policy support					
firm received government support	13791	35.06	0	100	47.72
Cash transfer	13238	12.34	0	100	32.89
Deferral of credit / mortgage payments	13371	10.9	0	100	31.16
Access to new credit	13374	7.28	0	100	25.99
Fiscal exemption	13365	11.82	0	100	32.29
Wage subsidies	13398	28.38	0	100	45.09

31/05/2022