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## Firm-level evidence

European Investment Bank
The EU bank

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# Productivity and responses to the pandemic: Firm-level evidence

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Abstract

In this paper, we empirically assess repercussions of the pandemic on the firm-level productivity worldwide. COVID-19 shock was very heterogeneous across sectors. Our findings show that firms' responses to the shock also varied within sectors: more productive firms coped with the crisis better in terms of closures and employment adjustments. Besides, they were more likely to speed up some digitalization processes. These findings imply that 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, suggesting room for a more targeted approach in the reminder of the pandemic.

Keywords: Covid-19, Productivity, Enterprise Survey

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# 1 Introduction

The pandemic has had a strong impact on firms. Many enterprises were forced to shut down their businesses temporarily, some even permanently. Many needed to lay off a large share of their employees, cut their profit margins or re-orient their business models to diversify their stakeholder base. The COVID-19 shock affected both, the supply-side and the demand-side of their business, forcing firms to re-optimize their plans and take immediate actions to stay afloat. Some firms were able to use the crisis as an opportunity to digitalize their processes, stepped up the online delivery, introduced or extended teleworking, while others were not allowed to operate at all due to governments' measures to contain the spread of the virus. Besides, the policy response was unprecedented. Governments and central banks stepped in, preventing an even deeper and more protracted economic crisis.

In such a crisis environment, it is easy to assume that productivity was impacted. The pandemic led many observers to believe that a K-shaped recovery is underway in which firms that are highly productive, digital, and financially sound, will acquire market share and prosper, while smaller firms, operating particularly in some services sectors, might lose market share or possibly even close down. In circumstances, where many factors interplayed, it is exceedingly difficult to disentangle which of them affected the firm-level productivity the most and to which extent and how firms reacted to the COVID-19 shock. Once unprecedented policy support is added to this puzzle, the picture becomes even less clear.

In this paper, we examine the COVID-19 module of the EIB-EBRD-WB Enterprise Survey to provide an empirical assessment of how firms of different productivity levels were impacted by the pandemic and how they fared. We confirm that COVID-19 shock was very heterogeneous across sectors, hitting particularly the consumer-driven services sectors, while manufacturing, ICT and similar industries are likely to feel more transitory impacts. In addition to the cross-sectoral differences, we also analyse within-sector changes. We show that more productive firms coped with the crisis better in terms of closures and adjustments in production, such as introduction or extension of online sales or remote work. The sources of their relative success may lay in their state-of-the-art technology, the resilience of their portfolio or simply in the superiority of their management or workforce.

This finding leads us to believe that the pandemic could amplify the difference between highly productive and less productive firms. Such a result is confirmed also once additional waves of the COVID-19 module are considered. As regards the governments' policy measures, we find strong utilization at the firm level, but little differentiation across productivity quantiles. On the one hand, this could be a result of less targeted support in the initial phase of the crisis, which was meant mainly to prevent even worse economic outcomes. On the other hand, it could be that factors outside of our investigation, such as the political economy and institutional considerations, might have played a stronger role in this respect.

The paper is organized as follows. Section 2 motivates the paper via literature review. Next, we present some descriptive statistics in Section 3. Section 4 offers the empirical results. Finally, we conclude with some policy recommendations.

# 2 Motivation and literature

The pandemic wiped out 3.5% of global GDP in 2020 (IMF, 2021a), together with 8.8% reduction of global working hours or equivalent to 255 million full-time jobs (ILO, 2021). Without the extraordinary fiscal support, which the IMF estimates of about USD 14 trillion (IMF, 2021b), and monetary policy stimuli implemented by major central banks, the pandemic would leave even more lasting scars on the world economy.

From a theoretical standpoint, such an unprecedented crisis is likely to generate shifts in productivity. Fuentes & Moder (2021) argue that the pandemic could affect total factor productivity in several ways. First, the crisis could initially lock resources in unproductive sectors, slowing down the reallocation of productive resources towards fast-growing industries. Second, innovation could be impaired through lower spending on R&D, both in the public sector on the account of consolidation needs and in the private sector owing to elevated uncertainty. Third, reshoring of global value chains in the aftermath of the pandemic could hamper innovation and knowledge spillovers across countries. On the other hand, digital technologies spurred by the COVID-19 crisis have the potential to accelerate the digital transformation of the global economy and therefore contribute positively to total factor productivity.

Evidence from previous crises also offer some useful insights. They suggest that firms were more likely to cut investment and innovation on such occasions (e.g. Granja and Moreira (2019) or Duval et al. (2020)). This led Baker et al. (2020) to believe that firms will significantly cut their expenditures on innovation and general management improvements, which is likely to lower future productivity as the COVID-19 uncertainty persists. Nevertheless, not all firms experience a similar magnitude of the shock. In their recent work, di Mauro & Syverson (2020) illustrate that "globalisation, labour mobility and small firms may all still fall victim to the crisis" but "the broad adoption of modern technologies – such as IT skills during the epidemic – and strong reallocation pressures may provide an independent boost on productivity as we come out of the crisis."

Overall, there are reasons to believe that the overall impact on TFP is ambiguous, which calls for an empirical investigation. Some preliminary empirical evidence on the impacts of the COVID-19 shock on productivity is already emerging in the economic literature.

In their recent analysis, Andrews et al. (2021) show that labour turnover declined in response to the pandemic[1] for three countries of the OECD. However, high productivity firms seem to have expanded, while less productivity firms were contracting. Furthermore, their evidence shows that firms that intensively used e.g. e-commerce, digital cash flow reporting or management software applications to run their business were more resilient, strengthening the case for the digitalization. More so, working culture and managerial practices might have already played a role in how successful firms were in tackling the pandemic. For example, Lamorgese et al. (2021) find a sizable, positive effect of management practices on firm

[1] Similar findings are also reported in a similar paper for Austria. See Andrews, D., Hambur, J., Bahar, E. (2021).

performance for Italian companies. It seems that better-managed firms were able to implement important organizational changes, including remote work.

Bloom et al. (2020), estimate that COVID-19 will reduce TFP in the private sector by up to 5% in 2020 Q4, falling back to a 1% reduction in the medium term in the UK. This impact is driven by a significant reduction in 'within-firm' productivity, as measures to contain the virus are likely to increase intermediate costs. Importantly, the negative 'within-firm' impact is somewhat offset by a positive 'between-firm' effect. Here, the least productive firms are disproportionately affected by the pandemic and consequently make a smaller contribution at the economy-wide level.

Indeed, Barrero et al. (2020) use the Survey of Business Uncertainty (SBU) and construct a novel, forward-looking reallocation measures for jobs and sales for the US. They find that COVID-19 is a major reallocation shock, crystalizing in several permanent job losses, "confirming anecdotal evidence of large pandemic-induced demand increases at some firms, with contemporaneous evidence on gross business formation, and with a sharp pandemic-induced rise in equity return dispersion across firms."

This notion is confirmed by a recent article of Akcigit et al. (2021). The analysis shows that corporate market power has been on the rise in recent decades. Importantly, authors also find that the pandemic will strengthen market concentration further as several small and medium-sized enterprises are likely to end up in bankruptcies.

Nevertheless, due to substantial policy support, bankruptcies have so far been largely prevented. Cros et al. (2021) show that factors that predicted firm failures (primarily productivity and debt) before the pandemic have also played a key role during the pandemic. Furthermore, public support seems to have distorted the sectoral component in predicting the probability to fail.

Furthermore, Kozeniauskas et al (2020) examine how firms were impacted by the COVID-19 and which firms have benefited from the government support. Using a panel survey of Portuguese firms conducted during the pandemic, which they match with pre-crisis administrative data, authors report very heterogeneous responses across 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.

Some papers have already been published also with the Enterprise Survey data. Bosio et al. (2020) estimate the survival time of firms in a dozen high-income and middle-income economies under the extreme shock. The authors estimate the median survival time across industries between 8 and 19 weeks, while firms have the liquidity to survive between 12 and 38 weeks on average. These estimates hold under the assumption of no incoming revenues and coverage of fixed cost only. It follows from the analysis that the pandemic should have strong repercussions for the reallocation of resources even if the authors do not investigate Schumpeter's theory of creative destruction, as the firm exit did not account for firms' characteristics or their productivity.

Using partly the COVID-19 module of the Enterprise Survey, which is key for our analysis, Cirera et al. (2020) discuss the impact of COVID-19 policy measures on enterprises. Authors find a clear mismatch between policies needed and policies provided, questioning the effectiveness of these measures in addressing liquidity constraints and preventing layoffs. The mismatch has been more pronounced in more vulnerable firms and countries. While this research does not provide direct implications for firm productivity, it might provide evidence that policymakers did not internalize much the productivity aspect in the initial phase of the crisis but acted as firefighters to prevent the worst.

With the COVID-19 module, Apedo-Amah et al. (2020) confirm the severe impacts of the pandemic on enterprises. It follows from their analysis that the COVID-19 shock has been severe and widespread across firms, 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. They also find evidence that smaller firms were disproportionately impacted, particularly via financial constraints. In addition, firms seem to have speeded up their digitalization agendas. Authors also document persistent impacts of the heightened uncertainty. Authors believe 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."

In our paper, we confirm and extend the previous findings. We support the hypothesis postulated in the Apedo-Amah et al. (2020) paper by showing that the COVID-19 shock has had a strong impact not only between, but also within various sectors. Firms that were more productive before the crisis suffered less in terms of output, employment and were more likely to extent remote work, likely amplifying the difference between laggards and winners. This finding is like the one in Kozeniauskas et al (2020) or Andrews et al. (2021a) but extended to a much broader set of countries. In this sense, Bloom et al. (2020) was right in judging that the least productive firms have been disproportionately affected by the pandemic and therefore the drop in productivity was smaller than it would have otherwise been. Nevertheless, our findings support the view that the market power of dominant firms is likely to increase as discussed in Akcigit et al. (2021) leaving the overall long-term impact undetermined as stipulated in the paper by Fuentes & Moder (2021), calling for further investigation. Our findings on firms' responses to policy measures remain rather inconclusive. On the one hand, massive and universal, but mostly untargeted, support was paramount for firms to survive the extreme COVID-19 shock as confirmed by an overly broad utilization of these packages by firms in our dataset. On the other hand, there is little evidence for a targeted support to address the productivity gap, which is likely to become an even more important topic as the recovery proceeds.

# 3 Data and variables

Our analysis builds on the World Bank Enterprise Survey (ES) datasets. Our 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[2] 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.[3] The resulting sample provides information on 18,765 firms from 32 countries. 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. See detailed information in Table 1 below.

Table 1. Number of firms in the Enterprise and the COVID-19 follow-up surveys by country

| | ES | follow-ups | | | | ES | follow-ups | | |
|---|---|---|---|---|---|---|---|---|---|
| | survey | I | II | III | | survey | I | II | III |
| Albania | 377 | 344 | | | Latvia | 359 | 240 | 265 | |
| Armenia | 546 | 460 | | | Lebanon | 532 | 364 | | |
| Azerbaijan | 225 | 101 | | | Lithuania | 358 | 213 | 222 | |
| Belarus | 600 | 530 | | | Malta | 242 | 193 | 193 | 187 |
| Bosnia and Herzegovina | 362 | 234 | | | Moldova | 360 | 283 | 282 | 246 |
| Bulgaria | 772 | 521 | 499 | 501 | Mongolia | 360 | 284 | 233 | |
| Croatia | 404 | 342 | 327 | 324 | Montenegro | 150 | 136 | | |
| Cyprus | 240 | 167 | 172 | 181 | Morocco | 1,096 | 781 | 704 | |
| Czech Republic | 502 | 398 | 396 | 435 | North Macedonia | 360 | 291 | 243 | |
| Estonia | 360 | 272 | 289 | | Poland | 1,369 | 975 | 1018 | |
| Georgia | 581 | 501 | 482 | | Portugal | 1,062 | 743 | 770 | |
| Greece | 600 | 530 | 543 | 551 | Romania | 814 | 514 | 468 | 500 |
| Hungary | 805 | 619 | 643 | | Russian Federation | 1,323 | 1,145 | | |
| Italy | 760 | 419 | 424 | 412 | Serbia | 361 | 313 | | |
| Jordan | 601 | 498 | 448 | | Slovak Republic | 429 | 325 | 301 | 315 |
| Kazakhstan | 1,446 | 806 | | | Slovenia | 409 | 249 | 251 | 221 |

Note: The number of firms includes the completed follow-up interviews only either by CATI or online and the firms that could not have been interviewed fully as they have closed down or refused to answer are excluded from the above statistics. Closing date on survey collection: June 24, 2021.

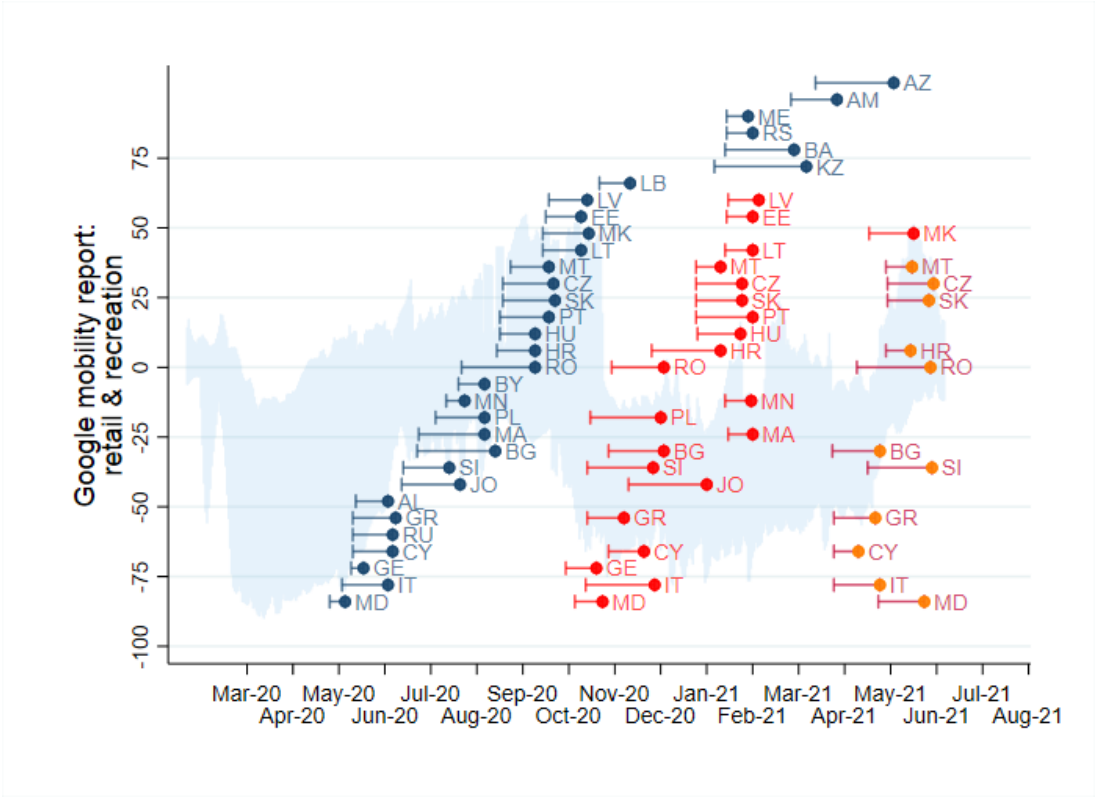
The COVID-19 follow-up surveys were carried out at different points in time in various countries. In Figure 1 we show the duration of the survey by country and across various waves (when applicable) against a timeline and the Google mobility indices. The Google mobility indices provide a useful benchmark to place the timing of the interviews with respect to the COVID-19 associated social distancing measures. For example, Figure 1 shows that the first interviews of the COVID-19 follow-up surveys were conducted during the initial wave of the pandemic in in Moldova, Italy and Georgia. Later interviews of the first wave, e.g. in Estonia and Lithuania, took place near the end of 2020 when most countries started to open-up again.

[2] All Enterprise Survey interviews were carried out in 2019, except in Greece and Belarus (both 2018).

[3] The Enterprise Survey is an establishment-level dataset.

The final interviews of the first wave were conducted only in early 2021 when the second wave of the pandemic already started. In the context of the analysis, such characteristics of the dataset caution against a direct cross-country comparison of the results.

Figure 1. The timing of COVID-19 follow-up surveys by country.




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.

The Enterprise survey covers a wide range of sectors classified with NACE rev 1. Sectors in our analysis include the following: 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).

Table 2. Description of variables

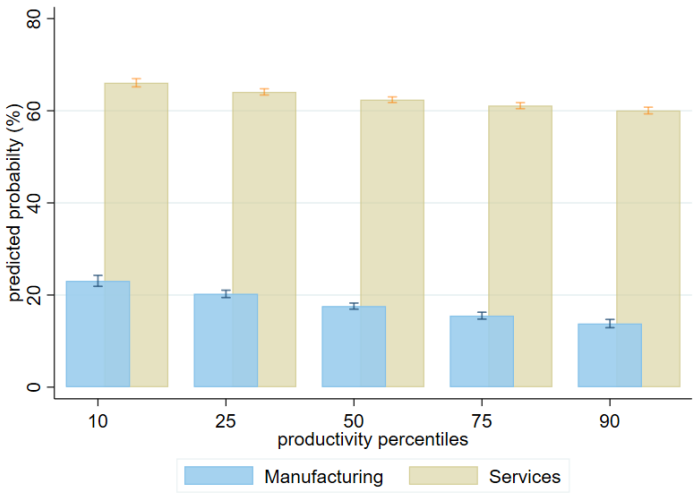
| | N | mean | min | max | sd |
|---|---|---|---|---|---|
| **PANEL A:** | | | | | |
| Productivity (sales/employment in logs) | 11990 | 10.47 | 3.43 | 17.52 | 1.36 |
| Labour productivity (value added/empl. in logs) | 6739 | 9.89 | -3 | 15.49 | 1.3 |
| Total factor productivity | 4275 | 3.08 | -1.35 | 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 |

In these surveys, the surveyed enterprises provided information about various actions, including closures (temporary or permanent), employment adjustment, as well as financial responses and expectations, perceived barriers, and utilization of policy measures. Here, we focus on firms' characteristics that are related to productivity and firms' operations. There variables are collected in Table 2 and discussed in the following subsection.

## 3.1 Productivity measures

We measure firm-level productivity as real sales per employee. The reason for this choice is twofold. First, real sales per employee statistics is available for a much larger number of firms in a wider range of sectors than other, more conventional measures at our disposal, such as labour productivity or total factor productivity (TFP). In addition, the latter is only available for the manufacturing firms and not for those in the service sector. Since the services sectors have been strongly impacted by social distancing measures, its inclusion is important for the purposes of the analysis. Figure 14 (in the Appendix) shows the share of observation in each country that have available productivity measures in both, manufacturing and services sectors.

Figure 2. 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.

The second reason for using sales over employees as a proxy for productivity is that labour productivity or TFP measures are not missing randomly across observations. In fact, missing data is more likely to be associated with lower sales per employee for both of them. Figure 2 shows that for both sectors, the share of firms with missing TFP or labour productivity measure are significantly higher in the lowest percentile of the sales per employment distribution than at the middle or at the top of the distribution.

This suggests that we would miss important variation from the lower ends of the productivity distribution if we had only used labour or total factor productivity measure and thereby bias the results. Within the restricted samples, however, our preferred measure of productivity correlates very strongly with the labour productivity, with the correlation coefficient of over 80%. Consequently, the correlation of our measure with TFP mimics the correlation of the TFP and labour productivity.

## 3.2 Variables for COVID-19 response

Our analysis relies on a wide range of variables available from the ES to evaluate firms' operational responses to the COVID-19 shock (see Panel C of Table 2).

Firm closures: In the first waves of the ES COVID-19 follow-up survey, we find that only a small fraction of firms closed down permanently (about 3% of the sample), consistent with other surveys and hard economic indicators that bankruptcies were rather limited during the pandemic. Nevertheless, a significant share of firms had to stop operations and close business temporarily. This happened in about 40 percent of firms in the manufacturing sectors, while in the Services sectors the percentage is even higher, at 45%.

Losses: Due to the COVID-19 shock, most firms also reported a loss in sales. When comparing their year-on-year sales losses with respect to the month at the time of the interview, more than 64 percent of firms, on average, reported to have suffered losses. Contrasting these losses against the last available pre-COVID sales figures allows us to create a continuous variable, measuring the relative size of the loss and an indicator variable for a loss of more than 30% in sales. As Table 2 suggests, on average, about a third of the enterprises experienced such severe losses.

Change in supply and demand: The social distancing and preventive measures created business disruptions. Firms were not only unable to supply consumers or other firms, but also the consumption has shifted away from some goods towards others (i.e. online services, delivery etc.). Table 2 suggests that, on average, nearly 60 percent of the surveyed firms experienced loss in demand and half of them had problems in their supplies.

Employment response: Adaptation of the firms to the pandemic also affected their labour decisions. Many firms had to lay off employees or send them on unpaid leave. In our sample, on average across countries, about one in ten firms reduced employment permanently and a less than a third sent workers on unpaid leave. This latter option was also facilitated with furlough schemes by the governments in many economies. In addition, several firms have decided to lower production and employment costs by reducing working hours.

Remote work and online sales: Increased use of digital technologies was key to continue business with fewer interruptions as the social distancing measures kicked in. The ES COVID-19 follow-up surveys allow us to concentrate on two such measures. First, firms report on the introduction or relying more on remote working solutions. On average, more than 30 percent of firms report to have increased remote working. Naturally, not all industries and business models allow for remote work, hence the average propensity varies across sectors. Second, we look at the introduction or increased utilization of online sales. Table 2 shows that, on average, about 24% of the firms increased online sales activity, suggesting that digitalization was an important aspect of the adjustment. In addition, we find that about a quarter of firms in the sample have also increased or introduced the delivery of their products, which also could have been driven by the increase in online sales.

### 3.3 Variables for policy support

Firms in the ES Follow-up surveys were also asked about access to the policy support. On average, 35 per cent of firms received at least one of the following government support measures enterprises were asked about: cash transfers, deferral of credit and mortgage payments, access to new credit, fiscal exemption and wage subsidy. As Table 2 shows, the most common policy instrument were the wage subsidies (28 percent of firms) to reduce unemployment, while the subsidized credit was used much less frequently (7 per cent of firms).

## 4 Empirical Strategy

Our key aim is to evaluate firm level outcomes, taking into account their productivity levels.

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

where the outcome variable 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 $\mathbf{X}$ is a vector of firm controls, $\psi$ and $\sigma$ represent country and sector fixed effects. We estimate Eq. (1) by taking into account that Enterprise survey is a stratified survey.[4]

To compare firms across the productivity distribution we evaluate the predicted outcome probabilities at various percentiles of the productivity distribution.

While we refrain from interpreting these relations in a causal way, it is important to note that the reverse causality can be ruled out. That is, our 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.

We focus primarily on the first wave of the COVID-19 survey. However, when and where available, we also include information from the second and the third wave of the follow-up surveys. In these cases, we restrict our sample to the countries where multiple waves are available.

4 Specifically, we use the following STATA command: svyset idstd [pweight = $W$], strata(strata_all) single(scaled). Where $W$ are establishment level weights provided with the COVID-19 follow-up survey rescaled at country level. For firms that are permanently closed, such weight is not available and we therefore rely on the weights from the ES structural surveys of 2018-2019 instead.

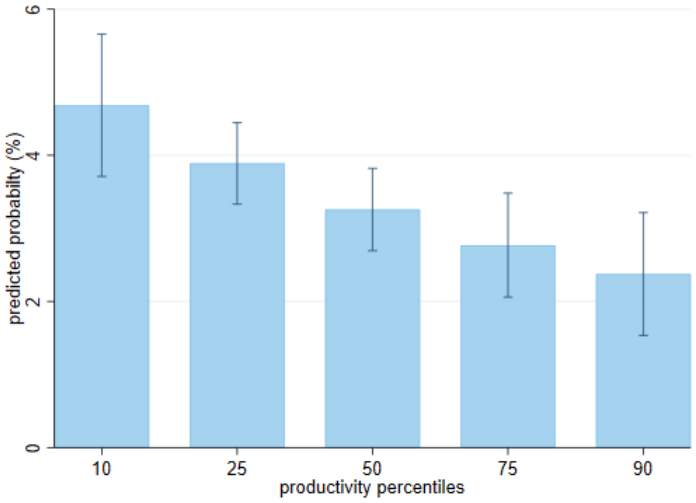
# 5 Results

The results section will investigate the following channels of adjustment and firms' responses with respect to firm-level productivity: size of the shock (loss in sales, temporary closures), employment responses and changes in firms' operational framework (remote work, online sales and delivery).

## 5.1 Firm closures and disruptions in operations

**Less productive firms are more likely to exit.** Figure 3 shows the predicted fraction of firms permanently closed at the time of the survey across the productivity quantiles. In the lowest productivity quintile, permanent closure is about twice as likely as for firms in the most productive quintile.

Figure 3. 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

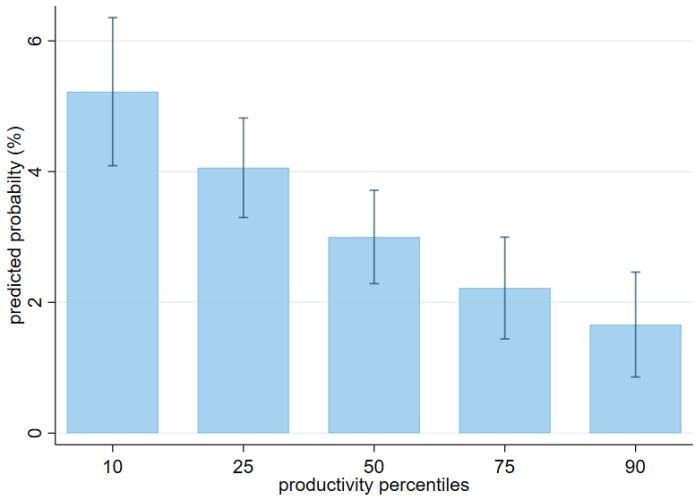
Note that we do not know how many firms would have closed down had the pandemic not taken place; Figure 3 shows the share of firms that were closed down due to the pandemic and of those who would have closed down anyway . There are two effects at work. On the one hand, a cleansing effect that forces out the least competitive and least productive companies. There is also a "scarring" effect present particularly in industries where business models did not allow easy adaptations to continued business operation when social distancing measures were in place.
Here, even the most productive companies can be forced to stop their operations.

In addition to the heterogeneity by productivity, the regressions underlying Figure 3 reveal that younger firms, larger firms (median sized) and exporting firms are less likely to close down. See **Table 3** and Table 4 in the appendix for a full set of results.

Table 3 also highlights the marked differences of the Covid-19 shock across the sectors. Results confirm that industries depending on face-to-face interactions (e.g. Hotels and restaurants) and those effected more by social distancing measure were more likely to close down temporarily and suffer greater losses.

**Less productive firms are more likely to file for bankruptcy or insolvency**. As Figure 4 suggest, the least productive firms are about twice as likely to file for bankruptcy compared to the most productive firms (see also Table 3).

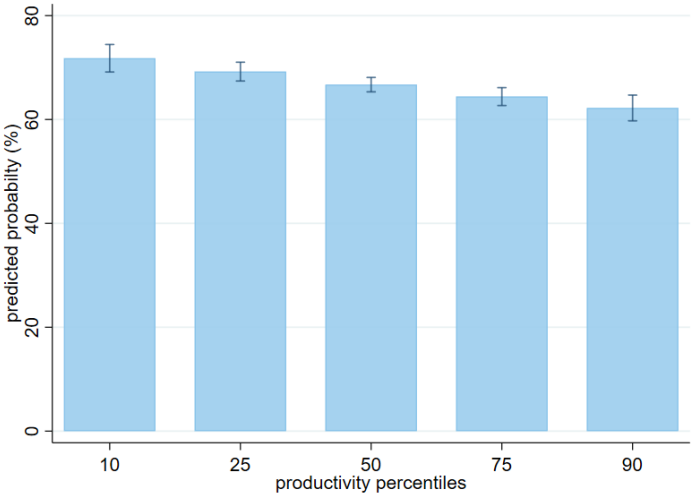
Figure 4. Predicted probability of bankruptcy and insolvency




Note: The columns show the predicted share of firms that file for bankruptcy 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.

**Sales decline is less likely among firms that are more productive.** Figure 5 shows the predicted probability of sales declines compared to the same month of last year. We find that overwhelming majority of firms have experienced sales losses. In the case of the least productive decile, the probability of losses are above 70 percent, while in the top decile they are significantly lower, at close to 60 per cent. We find that the results are unchanged when we concentrate on the larger losses, defined at 30 percent. See Table 3 in Appendix.

Figure 5. Change of sales due to COVID-19 compared to last year



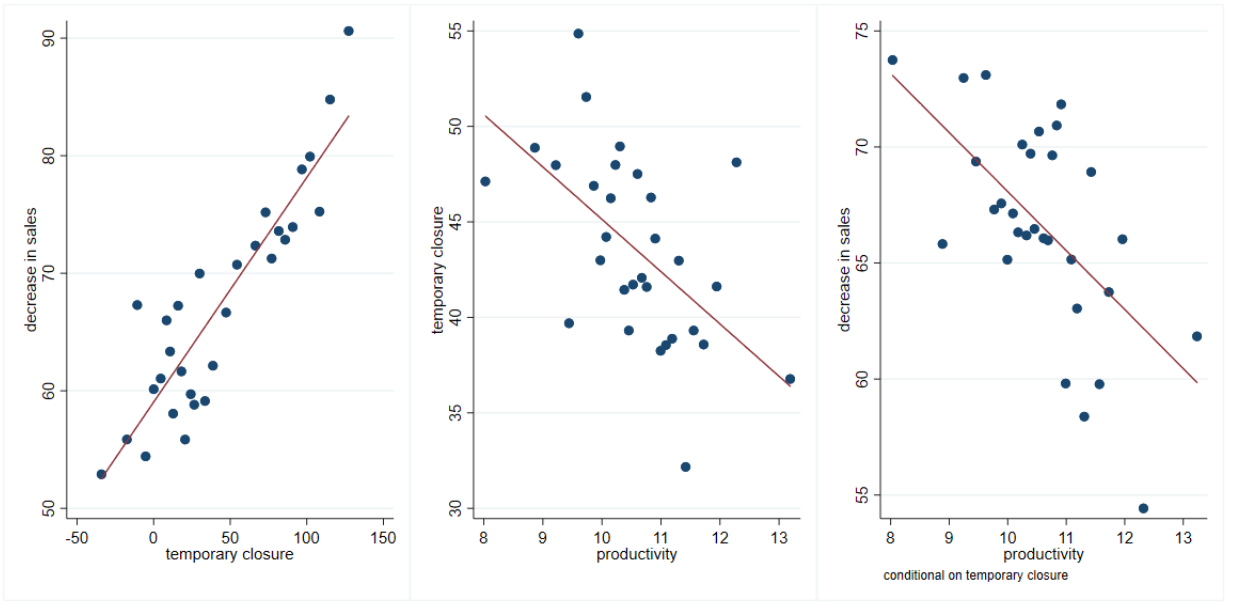

Note: The columns show the predicted share of firms that report sales losses by productivity moments. The results are obtained from survey regressions with COVID-19 Follow-up survey weights of the Enterprise Survey. Regressions are derived from Eq. 1 and control for country and sector fixed effects and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

**Losses in sales are negatively correlated with temporary closures: more productive firms are less likely to close their business temporarily.** The fact that firms had to close, either because of the lock-down measures or to accommodate their businesses to comply with social distancing regulations, had significant effects on their sales. On average, firms that closed down temporarily are 18 percent more likely to suffer losses, and 22 percent more likely to report losses of above 30%.

The relationship between temporary closure, sales loss and productivity is illustrated in Figure 6.[5] First, the leftmost panel shows that the probability of sales decline is higher for enterprises that closed their businesses temporarily. Second, the middle panel shows that the more productive firms are less likely to close down temporarily. The predicted probability of losses for the most productive firms (90$^{th}$ percentile) is 39 percent, while for an enterprise in the least productive decile, this probability increases to 47 percent. Third, we find that more productive firms are less likely to report significant losses in sales, despite the close connection between temporary close-downs and losses in sales: the negative relationship between losses and productivity prevails even after controlling for the temporary closures.

[5] The graphs are produced by STATA-s binscatter command, where average values variables on the vertical axis are displayed against the percentile groups of the variable on the horizontal axis. Each of the 30 dot represents the same number of observations.

Figure 6. Temporary closure, decrease in sales and productivity

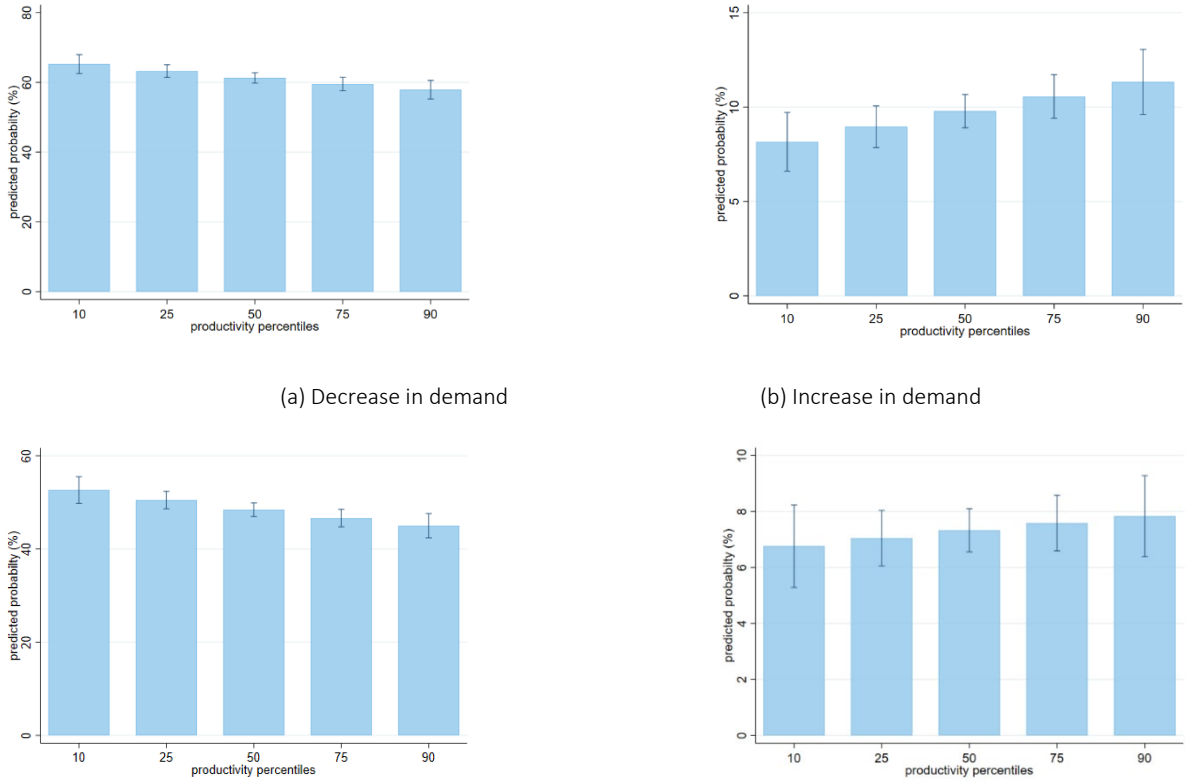



Note: The figures are obtained by combining binscatter plots with weights from the COVID-19 follow-up of the Enterprise Survey, they include country and sector (ISIC 2 digit) fixed effects. From left to right: The relationship between loss in sales and temporary closure, the relationship between temporary closure and productivity and the relationship between a decrease in sales and productivity conditional on temporary closure.
Binscatter calculates averages over residualised variables obtained from multivariate regression, hence outside range values can occur. See leftmost graph x-axis on temporary close indicator variable [0,100].

In addition, not only the demand for firms' products and services were affected but also the availability of inputs from suppliers. These both trigger a strong impact on business-to-business interactions. In fact, most firms (60% on average) report decreased demand for their products or services. Not surprisingly, we find that all these disruptions were most frequent in the Hotels and Restaurant and in the Textiles and Apparel manufacturing (see Table 3).

**The most productive companies are less likely to report a decrease in demand or in the supplies of intermediate inputs.** As Panel a) of Figure 7 shows, in the lowest productivity decile, 67 per cent of the firms report a decrease in demand. At the top quintile, the percentage is at 54. Similarly, in the lowest quintiles, 57 per cent of enterprises report having experienced a reduction in the supplies for their product or service, in contrast to the 45 per cent reported, at the top quintile. These results do not imply that the shock was smaller for more productive firms, but rather hint at the resilience and capability of those firms.

Figure 7. 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

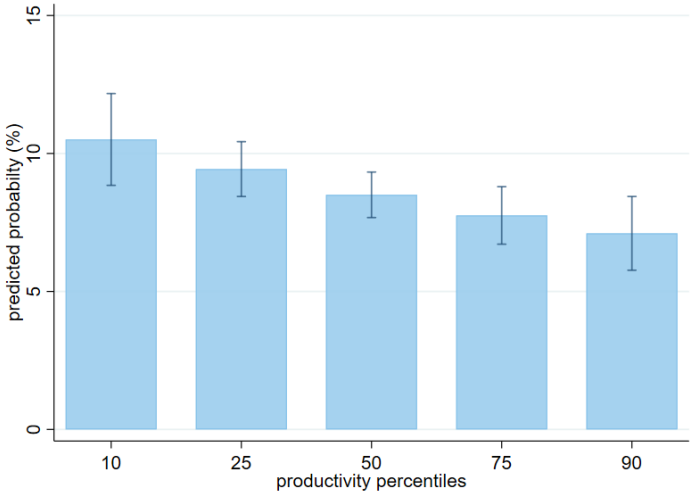
Note: The columns show the predicted share of firms that report (a) decrease or (b) increase in demand for their product or services or that report (c) decrease by productivity moments. The results are obtained from survey regressions with COVID -19 Follow-up survey weights of the Enterprise Survey. 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.

## 5.2 Employment responses and changes in business operations

**Firms that are more productive are less likely to shed jobs.** Our results show that the pandemic had a rather strong impact on employment. In fact, as much as 7% of firms in the sample laid-off their workers.

Figure 8 investigates the relationship between the share of employment losses and firms' productivity. We find that over 10 percent of the least productive firms reduced employment, while the corresponding estimate for the most productive firms is below 7%.

Figure 8. Predicted probability of employment layoff

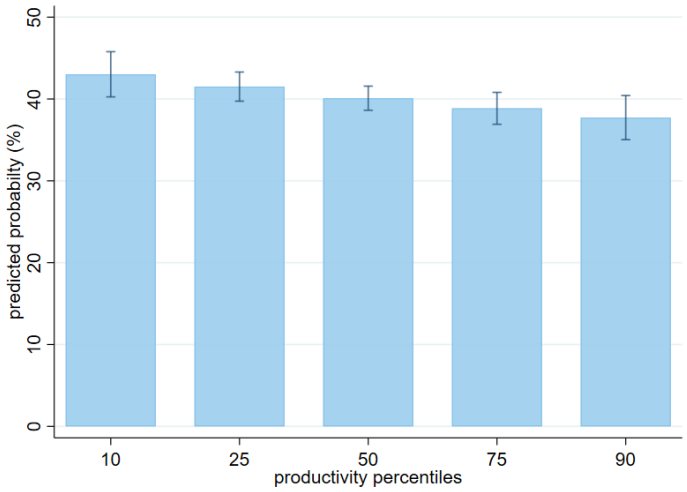



Note: The columns show the predicted share of firms that report employment layoff by productivity moments. The results are obtained from survey regressions with COVID-19 Follow-up survey weights of the Enterprise Survey. Regressions are derived from Eq. 1 and control for country and sector fixed effects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

**Less productive firms are also more likely to reduce working hours**. As Figure 9 suggest, about 35 per cent of the firms in the highest productivity bracket reported reduction in working hours, compared to above 45 per cent in the lowest productivity bracket. In addition, less productive firms are more likely to use unpaid leave possibilities (furlough scheme). This result seems to be strongly associated with temporary closures. We find that, on average, low productivity firms sent more than 20 per cent of their employees on unpaid leave and/or took advantage of the furlough scheme[6] (See **Figure 10**.) The corresponding average for high productivity firms is significantly lower, but not zero. This is not surprising and confirms previous findings that even some of the most productive firms had to close down their business temporarily. As the right panel of **Figure 10** suggests, the share of workers using these schemes is strongly associated with temporary closures.

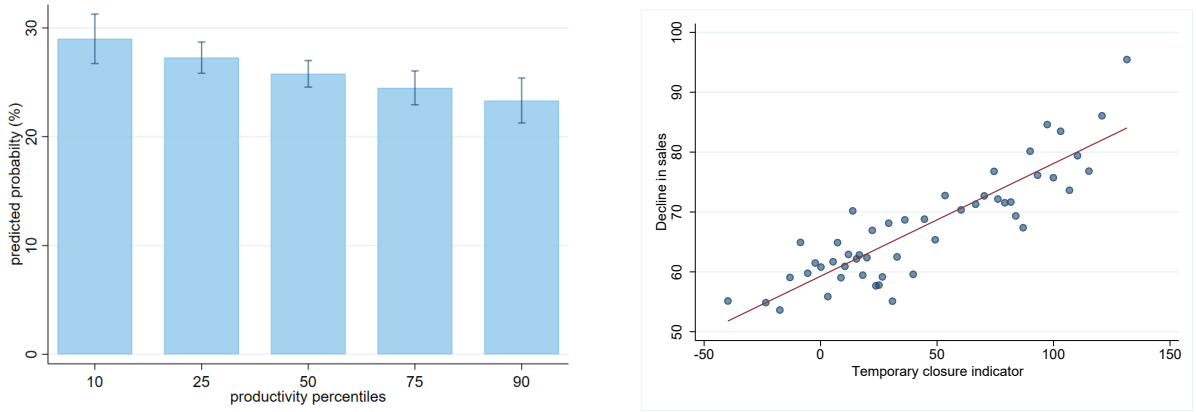
[6] In the Enterprise survey, furlough schemes are country specific. Either it means unpaid leave or it can mean furlough scheme as a form of government measure where a share of wage of the workers is paid by the local or central government. We find that in the dataset furlough schemes do not necessarily coincide with wage subsidy.

Figure 9. Reduction of working hours




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.

Figure 10. Workers in furlough schemes

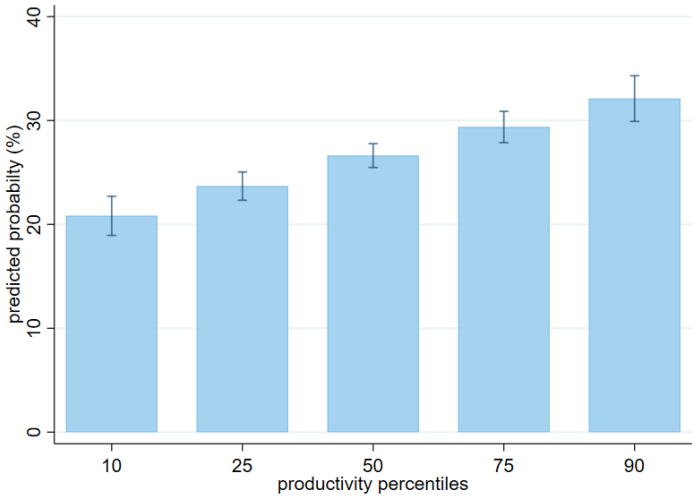



Note: The left pane shows the average share of employees sent on unpaid leave (furloughed) in response to the C-19 crisis by productivity quintiles. The results are obtained from survey regressions with COVID-19 Follow-up survey weights of the Enterprise Survey. Regressions are derived from Eq. 1 and control for country and sector fixed effects and firm size, age, ownership and exporting status. Error bars correspond to 10 percent significance level. The right panel shows a binscatter plot on the relationship between the share of employees sent on unpaid leave (furloughed) and the variable indicating firms' temporary closure. Binscatter calculates averages over residualised variables obtained from multivariate regression, hence outside range values can occur. See graph x-axis on temporary close indicator variable [0,100].

**More productive firms are more likely to introduce or increase remote work even after controlling for sector heterogeneity.** As the left panel of Figure 11 suggests, the most productive firms are twice as likely to introduce/extent remote work as the least productive ones. However, this could be a results of sector-specificities as face-to-face interaction differs from sector to sector, limiting the extent to which remote work can be introduced (See Dingel and Neiman (2020) or Koren and Pető (2020) for details). However, even after controlling for

sectoral differences, we find that the fraction of firms increasing remote work is positively associated with productivity.

Figure 11. Introduction or increase of remote work by productivity.




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.

Finally, we also investigate whether firms converted products and services, increased or introduced online sales or increased or introduced delivery. We find that these adjustments were in fact very frequent. Interestingly, our results show that none of these responses are strongly connected to productivity (see Table 4 for regression results in the Appendix).

## 5.3 Longer run responses of enterprises

In this subsection, we look at the sample of countries (see Table 1) where multiple waves of COVID-19 follow-up surveys are available to investigate firms' adjustment strategies as the time passes. With the multiple information on the same enterprises from various points in time over the pandemic available, we can assess how firms' responses changed over time and how successful the enterprises were once their productivity distribution is considered.

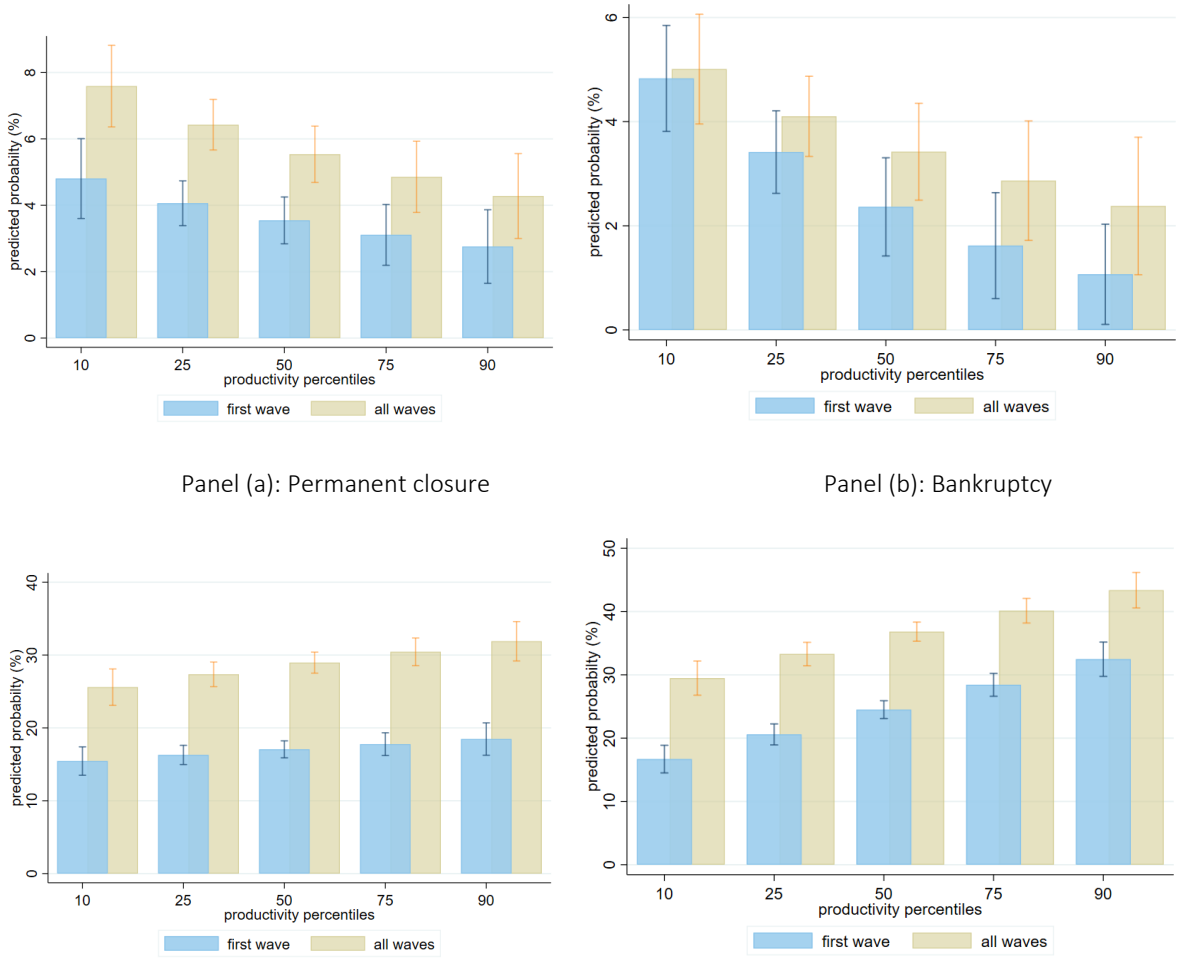
We highlight four responses: permanent closure, filing for bankruptcy or reporting insolvency, online sales activity and introducing or increasing remote work.[7] The predicted probability of these responses at various percentiles of the productivity distribution is depicted in Figure 12. Each panel looks at a separate response probability based on the enterprise response from the first wave and contrasts it to probabilities estimated based on the information from all the available waves together.

[7] Not all questions of those in the first wave of COVID-19 follow-up questions are available in later waves.

As Panel a) shows, the probability of a permanent closure increases over time throughout the full range of the distribution: the probability increases for low and high productivity firms alike. In contrast, the evolution of bankruptcies varies across the productivity distribution over time. As Panel b) suggests, the initial clear advantage with respect to the probability of bankruptcy of the more productive firms decreases, as the probability of bankruptcy increases over time relatively more for more productive firms. However, the probability difference between the most and the least productive enterprises remains significant.

Panel c) shows that the share of firms engaging in online sales increased over time by more than 10 percent on average. This implies that in the full pandemic period examined (all available survey waves together), about 25 percent of the least productive firms and more than 30 percent of the most productive firms increased of introduced online sales. We also show that the gap between the most and the least productive firms – in terms of use of online sales - increased further.

Figure 12. Longer term responses to COVID-19 shock by productivity




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.

Panel d) looks at the remote work responses over time. We find that the probability of introducing or increasing remote work solutions increased by 10-15 percentage points at each point of the productivity distribution. The clear advantage of more productive firms prevails and remains significant.

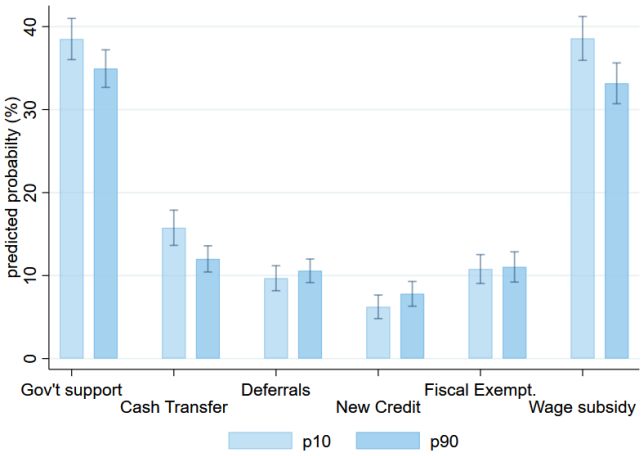
## 5.4 Government measures

This section looks at the availability of government measures, either at the central or the local level, depending on firms' characteristics, taking into account firms' responses to the pandemic. We look at several types of measures reported in the Enterprise Survey, their prevalence and their availability.

The use and need for policy support shows heterogeneity both across the type of the support and across sectors. As Table 2 shows, the most common policy instrument were the wage subsidies to reduce unemployment, while the subsidized credit was used much less frequently. Support was also more channelled towards sectors that were more affected by the social distancing measures. Results from logistic regressions on government support presented in Table 5 (Appendix) suggest that firms operating in hospitality sectors were more likely to receive support, while those in the Construction and Telecom sectors were less likely to obtain it.

In general, we do not find strong evidence that policy support was channelled to less productive, less viable firms. However, looking at the specific policy measures, one can find some heterogeneity. As **Figure 13** (derived from **Table 5** regressions) shows, cash transfer and wage subsidies are the policy instrument that most productive firms were less likely to receive. However, we also find that this negative correlation between public support and productivity is not significant any more once the size of sales loss or temporary closure is controlled for. See Table 6 in the Appendix. Such findings mainly confirm our prior that policy support was largely untargeted due to the emergency situation caused by the pandemic. Our results also confirm that sales loss channel was one of the crucial elements considered as regards the allocation.

Figure 13. Allocation of policy measures by productivity




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.

# 6 Discussion

In this paper, we show how firm across the productivity spectrum reacted to the COVID-19 pandemic and how they fared so far. While the pandemic induced strong country heterogeneity in terms of 2020 recession and the projected recovery, it is far less clear how within- and cross-sectoral firm-level productivity differentials were affected and what are the major implications for the total factor productivity as the recovery kicks in.

Furthermore, while it is evident that enormous policy support prevented numerous bankruptcies and cautioned against further lay-offs, it is far less straightforward how implemented policy measures interacted with firms and how, if at all, these actions effected firm-level productivity distribution. As these measures are gradually phased out, it will become increasingly important to re-introduce competition and level playing field so that productivity is fostered in coming years.

In our paper, we try to provide some insight into these complicated relations by extending previous findings from the economic literature. First, we confirm the hypothesis regarding the impact on productivity postulated in the Apedo-Amah et al (2020) paper by showing that the COVID-19 shock has had a strong impact not only between, but also within various sectors.

More productive firms generally weathered the pandemic better in terms of lost output or employment. In addition, they seem to have introduced or extended remote work more than their less productive peers. As such, this is likely to amplify the difference between the less productive laggards and more productive winners. Such a finding is similar to the one in Kozeniauskas et al (2020) but extended to a much broader set of countries, also supporting findings of Bloom et al. (2020). It also comes clear from our results that sectors that were subject to social-distancing and other containment measures, suffered more regardless of their productivity levels. This points to a potential cross-sectoral reallocation as the recovery proceeds.

While it follows from our results that the least productive firms are disproportionately affected by the pandemic and therefore the drop in productivity was smaller than it would otherwise have been, we also find that the re-allocation took place even among the top productive firms, irrespectively of the sector within which they operate. This suggests that even the most productive firms were impacted strongly by the pandemic.

Overall, it is still too early to conclude about the overall long-term impact on productivity. First, adjustment is still ongoing. Second, policy measures are still in place and are likely to mask the true impact that the crisis has had on the productivity. Indeed, our findings on firms' responses to policy measures remain rather inconclusive. On the one hand, massive and universal, but mostly untargeted, support was paramount for firms to survive the extreme COVID-19 shock as confirmed by a broad utilization of these packages by firms in our dataset.

It follows from our results that the impact on productivity was not a major concern for policymakers, as most of utilization of government measures can be explained by sales losses. This was likely made for a good reason. Nevertheless, more targeted measures are likely to be

paramount in coming years, particularly to address the green, digital and other gaps for a sustainable recovery, where firm-level competition is reintroduced.

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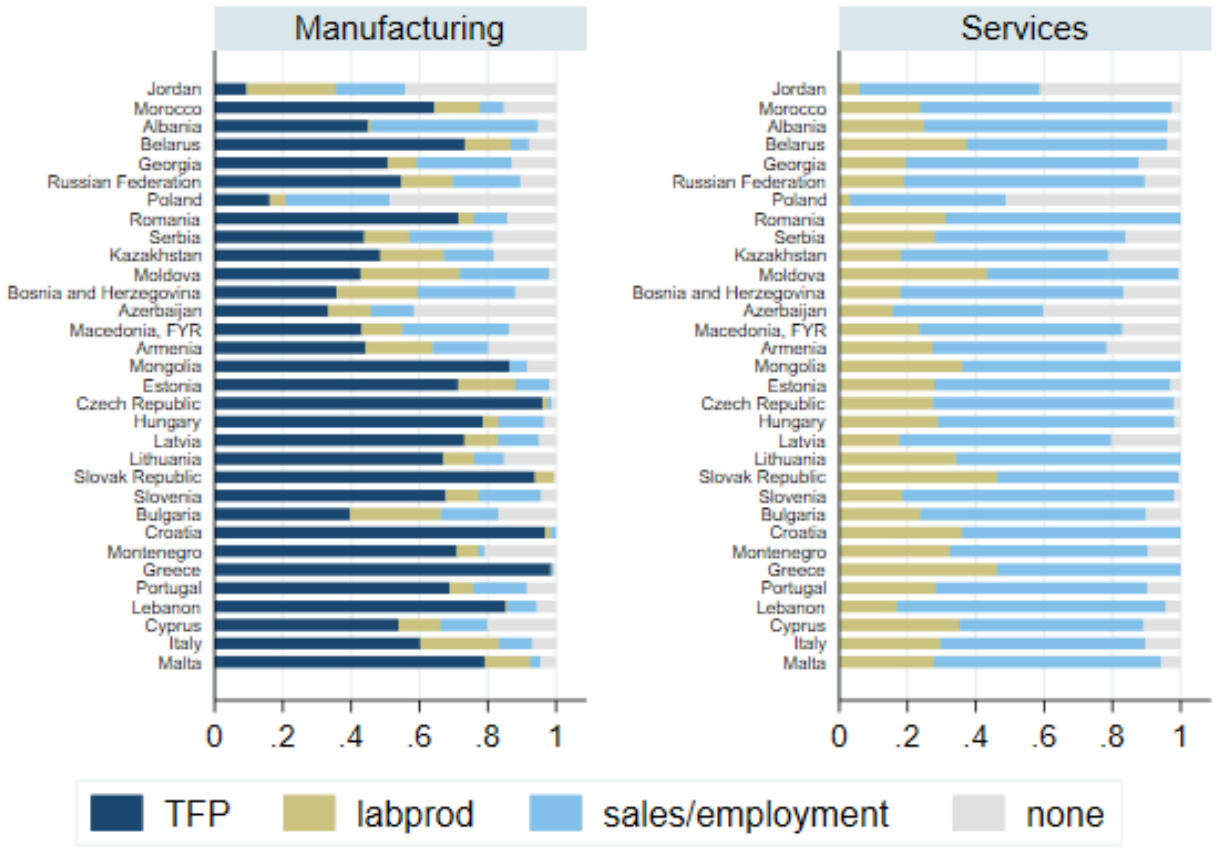
# 7 Appendix

## 7.1 Figures

Figure 14. Availability of firm level productivity measures.




Note: The figure shows the availability of three productivity measures, TFP, labour, productivity and sales/employment per country by sectors in (unweighted) percentage of firms. The bars are to be read additively: the share of firms that have all three measures available (TFP), only labour productivity and sales/employment (TFP+labprod), only sales per employment available (TFP + labprod + sales/employment). TFP is measures see Francis et al 2020 for details. Labour productivity is defined as real value added over number of employees. The value added is defined in sales net of the cost of raw materials and intermediate goods used in production in Manufacturing and as sales net of cost of finished goods/materials bought to resell in the services sectors.

Table 3. Logit regressions on COVID-19 response – Part I.

| VARIABLES | (1) closed | (2) temp. closed | (3) sales decline | (4) s. decline (<-30%) | (5) bank-ruptcy | (6) demand decrease | (7) demand increase | (8) supply decrease | (9) supply increase |
|---|---|---|---|---|---|---|---|---|---|
| productivity | 0.81** | 0.89*** | 0.85*** | 0.90** | 0.65*** | 0.89*** | 1.13** | 0.89*** | 1.06 |
| | [0.08] | [0.04] | [0.04] | [0.04] | [0.08] | [0.03] | [0.07] | [0.03] | [0.07] |
| enterprise age (in logs) | 0.74** | 0.86** | 1.06 | 0.95 | 0.59*** | 1.07 | 0.87 | 1.08 | 0.94 |
| | [0.10] | [0.05] | [0.07] | [0.06] | [0.12] | [0.07] | [0.09] | [0.07] | [0.10] |
| Medium size (20-99) | 0.58** | 0.76*** | 0.82* | 0.66*** | 0.81 | 0.93 | 0.98 | 0.97 | 0.84 |
| | [0.16] | [0.07] | [0.08] | [0.07] | [0.30] | [0.09] | [0.14] | [0.09] | [0.13] |
| Large (100 and over) | 0.57 | 0.57*** | 0.71** | 0.54*** | 0.88 | 0.81* | 1.45** | 0.86 | 1.41* |
| | [0.21] | [0.08] | [0.10] | [0.08] | [0.39] | [0.10] | [0.25] | [0.11] | [0.27] |
| Foreign ownership | 1.55 | 1.11 | 0.88 | 0.94 | 1.02 | 0.86 | 1.01 | 0.89 | 1.07 |
| | [0.75] | [0.21] | [0.17] | [0.18] | [0.81] | [0.16] | [0.22] | [0.17] | [0.26] |
| Exporter | 0.58* | 0.68*** | 0.91 | 1.01 | 0.70 | 0.82* | 0.92 | 0.87 | 0.96 |
| | [0.19] | [0.09] | [0.12] | [0.14] | [0.34] | [0.10] | [0.18] | [0.10] | [0.22] |
| Textile, Apparel, Leather | 1.79 | 5.52*** | 1.49* | 2.55*** | 0.59 | 1.85*** | 0.48** | 1.77*** | 0.39** |
| | [0.74] | [1.25] | [0.35] | [0.57] | [0.50] | [0.42] | [0.17] | [0.38] | [0.15] |
| Wood, Paper, Publishing | 0.76 | 2.26*** | 1.87*** | 1.89*** | 1.67 | 2.09*** | 0.36** | 2.05*** | 0.37** |
| | [0.56] | [0.51] | [0.45] | [0.43] | [1.33] | [0.48] | [0.14] | [0.45] | [0.16] |
| Coke, Petrol | 0.83 | 1.05 | 0.43** | 0.49 | 0.03*** | 0.54* | 1.95 | 0.84 | 1.96 |
| | [0.91] | [0.35] | [0.14] | [0.21] | [0.04] | [0.19] | [1.07] | [0.33] | [1.06] |
| Rubber, Minerals, Metals | 0.61 | 1.91*** | 0.86 | 1.16 | 0.88 | 0.86 | 0.97 | 0.98 | 0.86 |
| | [0.30] | [0.38] | [0.16] | [0.23] | [0.60] | [0.16] | [0.28] | [0.18] | [0.26] |
| Machinery, Electronics | 0.88 | 1.56* | 1.42 | 1.81** | 1.90 | 1.22 | 0.88 | 1.51** | 0.42** |
| | [0.56] | [0.39] | [0.32] | [0.47] | [1.53] | [0.27] | [0.29] | [0.32] | [0.17] |
| Motor Vehicles | 0.24 | 3.32*** | 1.27 | 1.76 | 0.16 | 1.67 | 0.45 | 2.34* | 0.33 |
| | [0.26] | [1.55] | [0.61] | [0.97] | [0.26] | [0.74] | [0.30] | [1.16] | [0.27] |
| Furniture, Recycling | 0.95 | 3.73*** | 0.93 | 1.46 | 0.65 | 0.98 | 0.86 | 1.09 | 0.71 |
| | [0.61] | [0.92] | [0.29] | [0.42] | [0.73] | [0.29] | [0.35] | [0.31] | [0.30] |
| Construction | 1.57 | 1.67** | 0.76 | 1.34 | 1.03 | 0.84 | 0.59* | 0.88 | 0.56* |
| | [0.65] | [0.34] | [0.14] | [0.27] | [0.70] | [0.15] | [0.18] | [0.15] | [0.18] |
| Wholesale | 0.92 | 1.90*** | 1.20 | 1.21 | 0.59 | 1.09 | 0.68 | 1.33* | 0.59* |
| | [0.39] | [0.35] | [0.22] | [0.23] | [0.38] | [0.19] | [0.19] | [0.23] | [0.17] |
| Retail | 1.27 | 2.27*** | 0.73* | 0.92 | 0.40 | 0.76* | 0.84 | 0.83 | 0.78 |
| | [0.48] | [0.41] | [0.13] | [0.16] | [0.25] | [0.12] | [0.22] | [0.13] | [0.21] |
| Hotels, restaurants | 1.84 | 9.27*** | 3.26*** | 4.50*** | 0.97 | 2.45*** | 0.20*** | 2.15*** | 0.24*** |
| | [0.75] | [2.06] | [0.86] | [0.96] | [0.56] | [0.54] | [0.09] | [0.44] | [0.11] |
| Transport | 1.43 | 1.82** | 2.14*** | 3.41*** | 1.74 | 1.94*** | 0.50** | 0.96 | 0.33** |
| | [0.72] | [0.43] | [0.53] | [0.81] | [1.19] | [0.43] | [0.17] | [0.21] | [0.14] |
| Telecom, IT, Computer | 1.26 | 0.91 | 0.56** | 0.74 | 0.02*** | 0.69 | 0.74 | 0.47*** | 0.34** |
| | [0.64] | [0.26] | [0.15] | [0.21] | [0.03] | [0.17] | [0.28] | [0.12] | [0.18] |
| Observations | 15,321 | 12,966 | 10,801 | 10,801 | 9,434 | 11,306 | 11,306 | 11,306 | 11,306 |

*** p<0.01, ** p<0.05, * p<0.1

Odds rations are reported. Regression includes country fixed effects (not reported)

Table 4. Logit regressions on COVID-19 response – Part II.

| VARIABLES | (10) convert production | (11) decrease w. hours | (12) empl. layoff | (13) unpaid leave | (14) remote work | (15) online sales | (16) delivery |
|---|---|---|---|---|---|---|---|
| productivity | 1.00 | 0.93* | 0.88** | 0.90*** | 1.25*** | 1.07 | 0.97 |
| | [0.04] | [0.04] | [0.05] | [0.04] | [0.05] | [0.05] | [0.04] |
| enterprise age (in logs) | 0.87** | 1.06 | 0.89 | 1.07 | 0.98 | 0.86** | 0.90 |
| | [0.06] | [0.07] | [0.10] | [0.07] | [0.07] | [0.06] | [0.06] |
| Medium size (20-99) | 1.03 | 0.90 | 1.28* | 1.11 | 1.58*** | 1.25** | 1.11 |
| | [0.10] | [0.09] | [0.19] | [0.12] | [0.15] | [0.13] | [0.13] |
| Large (100 and over) | 1.09 | 0.93 | 1.44** | 1.41** | 3.29*** | 1.59*** | 1.28 |
| | [0.16] | [0.13] | [0.26] | [0.21] | [0.42] | [0.23] | [0.23] |
| Foreign ownership | 1.09 | 0.95 | 0.82 | 0.95 | 1.83*** | 1.04 | 0.96 |
| | [0.21] | [0.19] | [0.22] | [0.21] | [0.31] | [0.18] | [0.22] |
| Exporter | 0.95 | 0.88 | 0.83 | 0.77* | 1.39*** | 0.97 | 0.90 |
| | [0.12] | [0.11] | [0.16] | [0.11] | [0.17] | [0.13] | [0.15] |
| Textile, Apparel, Leather | 1.20 | 1.98*** | 1.29 | 1.29 | 0.75 | 0.93 | 0.46*** |
| | [0.28] | [0.43] | [0.42] | [0.31] | [0.20] | [0.25] | [0.13] |
| Wood, Paper, Publishing | 0.79 | 1.89*** | 1.15 | 1.11 | 2.06*** | 1.16 | 0.70 |
| | [0.21] | [0.44] | [0.40] | [0.31] | [0.50] | [0.33] | [0.19] |
| Coke, Petrol | 0.56 | 0.63 | 1.03 | 0.73 | 1.53 | 1.09 | 1.77 |
| | [0.20] | [0.24] | [0.67] | [0.26] | [0.44] | [0.33] | [0.63] |
| Rubber, Minerals, Metals | 0.57*** | 0.71* | 0.74 | 0.96 | 1.16 | 0.50*** | 0.50*** |
| | [0.12] | [0.13] | [0.21] | [0.20] | [0.23] | [0.11] | [0.12] |
| Machinery, Electronics | 0.50*** | 1.19 | 1.10 | 0.73 | 1.62** | 0.64* | 0.42*** |
| | [0.12] | [0.27] | [0.42] | [0.20] | [0.36] | [0.17] | [0.13] |
| Motor Vehicles | 0.36* | 2.59** | 2.22 | 2.40** | 1.49 | 0.89 | 0.17** |
| | [0.19] | [1.08] | [1.67] | [0.99] | [0.72] | [0.62] | [0.14] |
| Furniture, Recycling | 0.69 | 0.74 | 0.89 | 1.06 | 0.95 | 0.63 | 0.48** |
| | [0.19] | [0.21] | [0.35] | [0.32] | [0.29] | [0.19] | [0.16] |
| Construction | 0.40*** | 0.88 | 1.00 | 0.85 | 1.23 | 0.49*** | 0.24*** |
| | [0.08] | [0.16] | [0.30] | [0.18] | [0.25] | [0.11] | [0.06] |
| Wholesale | 0.77 | 0.64** | 0.91 | 0.91 | 1.89*** | 1.24 | 0.77 |
| | [0.14] | [0.11] | [0.25] | [0.18] | [0.33] | [0.25] | [0.16] |
| Retail | 0.62*** | 0.71** | 0.86 | 0.93 | 1.25 | 1.34 | 0.97 |
| | [0.11] | [0.12] | [0.23] | [0.17] | [0.22] | [0.26] | [0.18] |
| Hotels, restaurants | 0.94 | 2.36*** | 1.68* | 1.97*** | 0.76 | 0.93 | 1.02 |
| | [0.19] | [0.47] | [0.46] | [0.43] | [0.18] | [0.21] | [0.23] |
| Transport | 0.60** | 1.55** | 2.03** | 1.20 | 2.01*** | 0.69 | 0.29*** |
| | [0.13] | [0.33] | [0.62] | [0.29] | [0.42] | [0.17] | [0.10] |
| Telecom, IT, Computer | 0.73 | 0.46*** | 0.86 | 0.37*** | 7.35*** | 2.55*** | 0.70 |
| | [0.18] | [0.12] | [0.36] | [0.14] | [1.93] | [0.67] | [0.21] |
| Observations | 11,373 | 11,306 | 12,624 | 12,027 | 12,966 | 12,624 | 12,966 |

*** p<0.01, ** p<0.05, * p<0.1

Table 5. Logit regressions on probability of policy support

| VARIABLES | (17) Govt support indicator | (18) Cash transfer | (19) Credit pay. deferral | (20) Access new credit | (21) Fiscal exemption | (22) Wage subsidies |
|---|---|---|---|---|---|---|
| productivity | 0.95 | 0.90* | 1.04 | 1.10 | 1.01 | 0.92* |
| | [0.04] | [0.05] | [0.05] | [0.08] | [0.07] | [0.04] |
| enterprise age (in logs) | 0.94 | 0.89 | 0.98 | 0.89 | 0.93 | 0.98 |
| | [0.06] | [0.08] | [0.09] | [0.11] | [0.09] | [0.07] |
| Medium size (20-99) | 1.13 | 0.71** | 0.88 | 1.10 | 0.82 | 1.22** |
| | [0.11] | [0.11] | [0.13] | [0.19] | [0.12] | [0.12] |
| Large (100 and over) | 1.37** | 0.74 | 1.41 | 1.01 | 1.00 | 1.53*** |
| | [0.18] | [0.16] | [0.31] | [0.27] | [0.21] | [0.23] |
| Foreign ownership | 0.80 | 0.51 | 0.57** | 0.51* | 1.13 | 0.92 |
| | [0.14] | [0.22] | [0.16] | [0.21] | [0.30] | [0.18] |
| Exporter | 0.89 | 1.11 | 1.14 | 1.11 | 0.86 | 0.81* |
| | [0.10] | [0.20] | [0.20] | [0.27] | [0.16] | [0.10] |
| Textile, Apparel, Leather | 1.29 | 1.81 | 0.90 | 0.72 | 1.63 | 1.31 |
| | [0.30] | [0.69] | [0.33] | [0.32] | [0.62] | [0.32] |
| Wood, Paper, Publishing | 1.37 | 1.43 | 1.48 | 1.68 | 1.31 | 1.56* |
| | [0.30] | [0.46] | [0.53] | [0.66] | [0.44] | [0.37] |
| Coke, Petrol | 1.01 | 1.00 | 0.74 | 0.12*** | 0.94 | 0.86 |
| | [0.35] | [0.56] | [0.34] | [0.06] | [0.54] | [0.31] |
| Rubber, Minerals, Metals | 0.99 | 0.95 | 1.20 | 1.44 | 1.05 | 1.09 |
| | [0.19] | [0.28] | [0.39] | [0.54] | [0.32] | [0.22] |
| Machinery, Electronics | 0.89 | 1.39 | 0.67 | 1.33 | 1.19 | 1.14 |
| | [0.20] | [0.41] | [0.26] | [0.54] | [0.45] | [0.28] |
| Motor Vehicles | 1.70 | 1.33 | 1.16 | 1.72 | 0.32 | 2.34* |
| | [0.90] | [0.90] | [1.05] | [1.35] | [0.23] | [1.21] |
| Furniture, Recycling | 1.01 | 1.38 | 0.92 | 1.29 | 1.01 | 1.74 |
| | [0.30] | [0.65] | [0.49] | [0.81] | [0.42] | [0.61] |
| Construction | 0.67** | 0.96 | 0.54* | 0.60 | 1.18 | 0.63** |
| | [0.13] | [0.29] | [0.18] | [0.26] | [0.38] | [0.13] |
| Wholesale | 1.10 | 1.51 | 0.98 | 1.19 | 1.35 | 1.26 |
| | [0.19] | [0.40] | [0.29] | [0.43] | [0.40] | [0.24] |
| Retail | 0.85 | 1.00 | 0.79 | 0.81 | 1.15 | 0.92 |
| | [0.14] | [0.24] | [0.23] | [0.28] | [0.34] | [0.16] |
| Hotels, restaurants | 1.99*** | 2.10*** | 1.54 | 0.95 | 2.37*** | 2.23*** |
| | [0.40] | [0.57] | [0.48] | [0.37] | [0.76] | [0.48] |
| Transport | 1.39 | 1.46 | 1.50 | 1.29 | 1.30 | 1.65** |
| | [0.29] | [0.45] | [0.53] | [0.56] | [0.46] | [0.39] |
| Telecom, IT, Computer | 0.62* | 0.66 | 0.36** | 0.94 | 0.55 | 0.54** |
| | [0.17] | [0.27] | [0.15] | [0.49] | [0.31] | [0.16] |
| Observations | 12,624 | 10,050 | 11,266 | 10,772 | 11,263 | 10,654 |

*** p<0.01, ** p<0.05, * p<0.1

Table 6. Logit regressions on probability of policy support with sales loss controls

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Public support | Cash transfer | Credit payment deferral | Access to new credit | Fiscal exemption | Wage subsidy |
| Panel A | | | | | | |
| productivity | 0.990 | 0.990* | 1.003 | 1.006 | 1.000 | 0.986* |
| | [0.007] | [0.005] | [0.004] | [0.004] | [0.006] | [0.008] |
| Panel B | | | | | | |
| productivity | 1.00 | 0.99 | 1.01 | 1.01 | 1.00 | 0.99 |
| | [0.01] | [0.01] | [0.00] | [0.00] | [0.01] | [0.01] |
| temporary closure | 1.18*** | 1.08*** | 1.03** | 1.02** | 1.06*** | 1.20*** |
| | [0.02] | [0.02] | [0.01] | [0.01] | [0.01] | [0.02] |
| sales loss more than 30% | 1.05** | 1.02 | 1.05*** | 1.02** | 1.02* | 1.08*** |
| | [0.02] | [0.01] | [0.01] | [0.01] | [0.01] | [0.02] |
| Observations | 10,962 | 9,759 | 10,929 | 10,442 | 10,924 | 10,399 |

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# Productivity and responses to the pandemic

## Firm-level evidence

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