FIRM-LEVEL HETEROGENEITY IN THE
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Abstract

This paper explores the heterogeneity across firms within each sector and region in the impact of and response to the COVID-19 shock. It relies on a survey conducted by Banco de España to 4,004 companies in November 2020 matched to very rich balance-sheet information on firm characteristics. According to our results, the impact of the COVID-19 shock was larger in the case of small, young and less productive firms located in urban areas within each sector-region pair. Moreover, these firms resorted relatively more to public-guaranteed loans, tax deferrals, and furlough schemes (ERTEs). More indebted companies, which were not hit relatively harder by the shock, also perceived public-guaranteed loans as very useful. Firms consider that uncertainty represents a key hindrance to the recovery, but observable characteristics do not explain the variation in the perception of uncertainty once the impact of the shock is accounted for. Finally, we use the announcement of the Pfizer vaccine on November 9th 2020 as a natural experiment to provide evidence that the vaccine announcement increased significantly firms' subjective recovery expectations.

Keywords: COVID-19, firms, sales, employment, uncertainty.

JEL classification: D22, L20, L25.

Resumen

Este artículo explora la heterogeneidad del impacto y la respuesta a la crisis del COVID-19 de las empresas españolas dentro de una misma región y sector. Los datos utilizados se basan en una encuesta realizada por el Banco de España a 4.004 empresas en noviembre de 2020, que cruzamos con información de los estados financieros de las empresas procedente de la Central de Balances del Banco de España. Los resultados muestran que la facturación y el empleo descendieron más en las empresas pequeñas, jóvenes y menos productivas localizadas en áreas urbanas. En el caso del empleo, una mayor ratio de temporalidad se encuentra asociada a mayores descensos de la ocupación. Además, estas empresas perciben los avales ICO, el aplazamiento de impuestos y los ERTE como herramientas útiles para mitigar los efectos de la actual crisis sanitaria. Las empresas más endeudadas también percibieron como muy útiles los avales ICO, pese a no haber sufrido relativamente más por esta perturbación. Las empresas consideran que la incertidumbre es uno de los principales factores que ha condicionado de forma negativa su actividad, pero las características observadas no pueden explicar la variación en la percepción de la incertidumbre una vez que se controla por la caída de las ventas. Finalmente, usamos el anuncio de la efectividad de la vacuna de Pfizer realizado el 9 de noviembre de 2020 como un experimento natural para mostrar que dicha noticia incrementó de forma significativa las expectativas subjetivas de recuperación de las empresas.

Palabras clave: COVID-19, empresas, ventas, empleo, incertidumbre.

Códigos JEL: D22, L20, L25.

1 Introduction

The global spread of the COVID-19 is having a significant human toll and represents an unprecedented shock for the economy, pushing most economies into recession. One of the most salient features of the virus-induced economic crisis is the asymmetry along several dimensions. Although a pandemic represents a text-book example of an ex-ante exogenous and symmetric shock, the actions taken by agents and policymakers have resulted in very different economic effects across sectors and regions/countries.[1] This is so because the scope of social-distancing measures depend on the social interaction intensity by sector of activity as well as the severity of the pandemic by region. While this heterogeneity is well-documented, much less is known about the asymmetric effects across firms within each sector and region. The purpose of this paper is to shed light on this issue. In particular, we investigate the heterogeneity of several aspects of the COVID-19 shock across firms: its impact on sales and employment, the firms' responses to mitigate the shock, their use of available policy instruments, and the main factors hindering firms' activity during the pandemic.

To this purpose, we use more than 4,000 responses to a new firm-level survey launched by Banco de España, the so-called EBAE (*Encuesta Banco de España sobre Actividad Empresarial* in Spanish). A unique feature of this survey is that we can use the firm identifier to match it to *Central de Balances*, a firm level data set that contains cash flow and balance sheet information of the quasi-universe of Spanish firms. Therefore, we can investigate the impact of and response to the shock on the basis of the responses to the survey and depending on firms' ex-ante characteristics. There are several advantages of this matched data. First, some of the key variables for our analysis can only obtained in surveys such as the EBAE, as they are not observed in administrative data. This is the case, for instance, of timely information on business activity at the firm level, particularly for SMEs, information about firms' expectations about future developments, their evaluation of various policy instruments and their perception of the degree of uncertainty. Second, matching this survey data with balance sheet data allows us to exploit (exogenous) pre-crisis differences in a large set of firms' characteristics, arguably with a higher degree of accuracy, and some of which would be hard to elicit from survey data, such as Total Factor Productivity (TFP).

In particular, we exploit within-sector-region variation so that identification comes from differences across firms operating in the same sector and the same region. Armed with this data and identification strategy, we aim to answer four main questions: (i)

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[1]Conceptually, the COVID-19 shock involves simultaneous disruptions to both supply and demand. On the supply side, some workplaces and businesses are shut down to halt the spread of the virus. On the demand side, households are less willing to leave their homes, either because of mobility restrictions or the fear of getting infected, which depresses consumption. Moreover, the fall in demand could be further exacerbated by the increase in unemployment resulting from the supply shocks highlighted above, which represent the so-called Keynesian supply shocks in Guerrieri et al. (2020).

what the heterogeneous impact of the COVID-19 shock on firms' turnover is; (ii) what firms' responses to this shock are; (iii) which policy measures are deemed more useful by firms for sustaining their activity; (iv) which factors affect firms' activity the most, with a special focus on firms' recovery expectations and uncertainty.

Our first set of results indicates that the COVID-19 shock hit harder small, young and less productive firms within each sector and region. As a consequence, many firms needed to adjust their employment, both in the extensive margin (firing or hiring) and/or in the intensive margin (temporary reduction in the staff thanks to the use of furlough schemes - ERTEs). While firms with a larger share of temporary workers decreased more their staff, firms that are larger, more productive and with more savings were able to better sustain employment.

The second set of results refers to the ways firms have adjusted to the shock: restoring to e-commerce, reducing investment, introducing teleworking, or firing workers (extensive margin of employment). Reduction in investment was the margin most used by firms (38%), followed by the implementation of working from home schemes (32%), the introduction of e-commerce (22%) and firing workers (18%). Working from home was useful for urban, large and young firms, with high share of intangible assets and a large share of permanent workers in their staff. E-commerce and the reduction of investment was more useful for less productive firms. Finally, firing was more used by firms with a large share of temporary workers. While firing of workers is not that widespread, effective employment used decreased significantly, as explained in the previous paragraph. This suggests that most of the adjustment in employment was done via the intensive margin (furlough schemes- ERTEs), which are explored further below.

The third set of results explores the role of the COVID-19 policy measures in sustaining firms' activity. Public guaranteed loans (ICOs) was the most useful measure, with nearly 40% of the surveyed firms reporting this policy measure had been important for sustaining activity. Furlough schemes (ERTEs) were important for 29% of the respondents, and tax deferrals and renegotiation of rental payments were deemed useful by 24% and 21% of the respondents, respectively. Turning to firm-level heterogeneity, smaller, less productive, younger, and more indebted firms resorted more intensively to public guaranteed loans (ICOs) and tax deferrals, while medium-sized and less productive firms resorted more intensively to furlough schemes (ERTEs).

The fourth set of results shows which are the main factors affecting firms' activity. Pandemic and political uncertainty take the lead (80% and 77%), followed by the evolution of demand (48%), unpaid receivables (34%) and competition pressures (33%), problems in access to financing (17%), disruptions in supply chains (13%) and availability of workers (10%). Due to the prominent role of uncertainty in this pandemic, we dig deeper into the heterogeneity of this uncertainty across firms. However, once we account for the size of the shock, observable firm characteristics cannot explain differences in the perception of uncertainty.

Finally, we make use of the announcement of the Pfizer vaccine effectiveness on November 9th 2020, right in the middle of the survey period, as a natural experiment to compare the recovery expectations of firms that responded to the survey before and after the announcement, and we find that this announcement improved significantly their prospects of recovery. This finding puts forward evidence that during a pandemic firms take into account medical developments when forming their expectations about economic recovery.

The remainder of the paper is organized as follows. A brief overview of the literature closes this introduction. Section 2 presents the survey details and the balance sheet data. Section 3 presents the heterogeneity in the impact of the shock on turnover, and the reaction of firms' employment. Section 4.1 shows the heterogeneity of the firm level responses to the shocks. Section 4.2 explores the heterogeneity in the use of the policy instruments aimed at mitigating the negative consequences of the COVID-19 shock. Section 5 looks at the main factors conditioning firms' activity, with subsection 5.1 focusing on the impact of uncertainty on firms' activity. Section 6 shows causal evidence of the impact of the vaccine announcement on firms' recovery expectations. Section 7 concludes.

Literature review

The paper contributes to the flourishing literature studying the impact of COVID-19 on businesses. Although studies examining the impact of previous pandemics on business activity are quite limited and typically focus on macroeconomic indicators (see Turner & Akinremi (2020) for a review), a rapidly growing literature on the economic consequences of COVID-19 and government response is emerging since the outbreak of the pandemic. The closest papers to ours are those using survey data to understand the impact of the COVID-19 shock on firms. Apedo-Amah et al. (2020) perform a survey focused on developing countries, and show that the COVID-19 shock has had persistent negative impact on sales, but the response of employment has been mostly along the intensive margin. Bartik et al. (2020) use survey data for the US to show that the pandemic brought a significant proportion of closures, job cuts and a fragile financial situation of firms. Bennedsen et al. (2020) use a large survey on small, medium and large Danish firms and find evidence that firms using government aid were also those in the most need, suggesting that support measures were effective in preserving employment. Bloom et al. (2021) use a panel survey of 2,500 SMEs in the US, and document smallest offline firms experienced sales drops of over 40% compared to less than 10% for the largest online firms. Humphries et al. (2020) use survey data to assess the impact of targeted COVID-19 policies on SMEs.[2] Our paper differs from these papers in that we can match the survey responses to very rich balance sheet data of firms, providing us with a variety

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[2]There is a growing number of papers using survey data to assess the impact of COVID-19 of firms, which are not listed here for the sake of brevity.

of firm-level heterogeneity dimensions to look at. Bloom et al. (2020) also match their survey data to Amadeus database to discern the impact of the COVID-19 shock on TFP. Our paper differs from theirs in that our sample is more representative, including small and very small firms, and that we focus on the heterogeneous impact of the shock using a broader set of heterogeneity measures, such as age, debt, cash holdings, etc. This is also an important difference with respect to other readily available data sources, such as Chetty et al. (2020), that analyze heterogeneity at group levels (area, industry, income level, business size), but are not suitable for exploring heterogeneity in other dimensions, such as productivity or indebtedness.

This paper is also related to the literature dealing with the impact of the COVID-19 shock on subjective perceptions and uncertainty. Altig et al. (2020) use several macroeconomic uncertainty indicators for the US and UK to show a huge uncertainty increase in reaction to the pandemic, but with different peak amplitudes and time paths in these two countries. One of their uncertainty measures also relies on subjective uncertainty measures computed from business expectation surveys, which shows that sales uncertainty rose by more than 100%. Furthermore, Barrero & Bloom (2020) argue this huge increase in uncertainty might be slowing the subsequent recovery and reducing the impact of policy measures taken. Buchheim et al. (2020) show with a panel of German firms that firms that perceived higher uncertainty, proxied by the perception of shutdown lasting longer, were more likely to implement strong measures like layoffs or canceling investments. Our paper contributes to this strand of literature by showing that, once the shock is accounted for, observable characteristics cannot explain any differences in perceived uncertainty. Furthermore, we provide causal evidence of the impact of the vaccine announcement on subjective firm level recovery expectations. On this front, our results complement those of Heap et al. (2021), who find that the vaccine announcement decreased the trust in government and elected politicians.

Finally, this paper is also related to the literature about the impact of COVID-19 on firms at different margins: incumbent's firm behaviour (Brotherhood & Jerbashian, 2020, Barrero et al., 2020); liquidity needs, credit constraints and solvency of firms (Schivardi & Guido, 2020, Balduzzi et al., 2020, Greenwald et al., 2020, Blanco et al., 2020), the efficiency of policies implemented to mitigate the COVID-19 shock (Gonzalez-Uribe & Wang, 2020, Goodhart et al., 2020, Zoller-Rydzek & Keller, 2020), the entry decision (Sedlacek & Sterk, 2020, Albert et al., 2020), among many others.

2   Data

2.1   Survey details

The survey was launched by Banco de España in November 2020, the so-called EBAE (*Encuesta Banco de España sobre Actividad Empresarial*), with the purpose of

monitoring Spanish non-financial corporations' activity in real time. The participation of companies is voluntary and responses were collected through a questionnaire sent to firms by e-mail. The survey was carried during the fortnight between the 4th and 19th of November 2020. The survey was submitted to a sample of 12,940 Spanish non-financial corporations, and we received 4,004 valid responses, which represents a response rate of 30,9%. Figure 10 of Appendix A.1 shows the responses received by day.[3] There is a slight over-representation of some sectors (e.g. manufacturing) and large firms (see Appendix A.1).

Survey responses aggregated at the sectoral and regional level capture well the recent developments in the Spanish economy. For instance, even at a high degree of disaggregation at regional or industry level, survey figures on employment growth are highly correlated with those of other sources (see Figure 9 in Appendix A.1). It is worth highlighting that both the survey and this paper focus on the intensive margin, namely, the performance of surviving firms.[4]

Questionnaire

The survey included a total of 8 questions, split into two parts. First, firms were asked about their views on the current and future evolution of business turnover, employment, and input and output prices, as well the effect of some general factors affecting their activity, such as the demand changes, access to external financing, supply disruptions or economic uncertainty, among others. A second set of questions aimed to calibrate more precisely the impact of and the response to the COVID-19 crisis. In particular, companies were asked about the degree of uptake of support measures, how far from normal activity levels they were, and how long it will take them to get back to normal. Appendix A.2 contains the full questionnaire, and in each of the following subsections we detail the questions used.

2.2 Balance sheet data: Central de Balances Integrada

Data on firm-level responses to the survey is combined with information on firms' characteristics that is available at a yearly frequency from the Central Balance Sheet Data (CBI, Central de Balances Integrada), which is sourced from firms' voluntary responses to Banco de España Central Balance Sheet Data Office (CBSO) surveys and the Spanish Mercantile Registry data; the ultimate sources of the data are therefore the Banco de

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[3]The distribution of firms that received the survey, the distribution of firms that responded the survey, and its comparison to aggregate data can be found on Appendix A.1.

[4]Indeed, non-responses to the survey may reflect companies that have closed permanently as a result of the COVID-19 shock. With respect to the extensive margin and in line with our findings below for the intensive margin, Social Security records shows that small firms have been hit harder by the COVID-19 shock: the number for firms with less than 49 employees decreased by -3.3% in 2020 while the fall in the case of larger firms (>500 emp.) was only -1.4%.

España and the Spanish Mercantile and Property Registrars' Association. This is an administrative database that contains information on firms' financial statements (required by law to be submitted to the commercial registry) as well as on their income corporate tax returns. The data covers around 90% of firms in the non-financial market economy for all size categories, including both turnover and number of employees. The correlation between micro-aggregated employment and output growth and the National Accounts counterparts is above 0.90 (see Almunia et al. (2018) for more details). The approach of matching CBI and survey data enables us to explore the role of firms' characteristics, which would be difficult to replicate in a survey, along several dimensions observed in the survey, such as the impact of COVID-19 on turnover and employment, since this information is only available in administrative registers with a sizable lag, firms' perception of policies to tackle the crisis and the degree of uncertainty about future developments. After the match EBAE-CBI, we end up with 3,584 observations.

For each firm, among other variables, we observe the firm's sector of activity (4-digit NACE Rev. 2 code), location (5-digit zip code), turnover, material expenditures, number of employees, share of temporary employees, age, debt ratio (interest-bearing borrowed funds to interest-bearing liabilities), share of intangible assets, the ratio of cash to total assets, and total fixed assets. Moreover, from these variables we compute a measure of total factor productivity (TFP) for each firm.

2.3 A first glimpse at the data

Table 1 presents some descriptive statistics at the sector level for the main variables of interest in our analysis. In particular, it provides figures on two sets of variables: responses to the survey (columns 1 and 2), and firm characteristics (columns 3-10). From Panel A, it is worth emphasizing the wide heterogeneity across sectors in both the average impact of the shock and the average firm characteristics. For instance, the average firm in manufacturing experienced a fall of -12.66% in turnover against the -45.53% fall for the average firm operating in the hospitality sector (-5.49% and -34.97% for employment, respectively). Also, the average firm in manufacturing is 33% more productive than that of hospitality (log TFP 1.28 versus 0.95), 8 years older, more rural (26% hospitality firms are out of cities against 44% manufacturing firms), less indebted, holds less cash and are much larger in terms of employees.

While heterogeneity across sectors is well-known, Panel B of Table 1 documents a more interesting and potentially more important source of heterogeneity, that is, heterogeneity across firms within the same sector, which is the main focus of the paper. In particular, it uncovers huge variation across firms within each sector as measured by the interquartile range (IQR) given by the difference between the 75th and the 25th percentiles. For example, the TFP difference between the 75th percentile and the 25th in the administrative services sector is even larger than the difference between the average

firm in manufacturing and hospitality from the table above: 0.54 against 0.33 (0.33=1.28-0.95). This indicates that, while the average manufacturing firm is 33% more productive that the average hospitality firm, the 75th percentile firm in administrative services is 54% more productive than the 25th percentile firm in the same sector. In terms of age, the manufacturing-hospitality average gap is 9 years, while the 75th-25th gap within admin. services is 17 years. Regarding the cash holdings of firms, and hence the starting buffer against the shock, there is also substantial heterogeneity, with the 75th percentile of firms in the IT services holding a share that is 10 times larger than that of the 25th percentile (0.36 vs 0.03).[5] We show in Table 9 on Appendix B that these summary statistics remain

Table 1: Summary statistics by sector

PANEL A

Averages	Δ Turnover	Δ Emp	log TFP	Age	Rural	Temp. Workers	Intangible capital	Debt Ratio	Size (Emp)	Cash ratio
Manufacturing	-12.66	-5.49	1.28	29.03	0.44	0.12	0.09	0.31	142.34	0.12
Construction	-12.23	-5.20	1.18	21.86	0.27	0.30	0.16	0.28	39.58	0.15
Trade	-15.55	-7.34	0.84	25.67	0.26	0.13	0.13	0.30	63.37	0.15
Transport	-16.34	-8.34	1.99	24.15	0.29	0.20	0.11	0.35	119.90	0.14
Hospitality	-45.53	-34.97	0.95	20.76	0.26	0.29	0.10	0.36	38.02	0.17
IT services	-11.33	-3.29	1.51	18.57	0.08	0.16	0.42	0.22	78.38	0.22
Real estate	-10.27	-3.23	1.11	23.37	0.14	0.05	0.05	0.26	6.03	0.12
Prof. services	-10.03	-5.01	1.70	19.34	0.13	0.12	0.25	0.24	45.68	0.24
Admin. services	-16.84	-11.92	1.77	17.98	0.16	0.22	0.26	0.31	254.79	0.23
Other services	-32.23	-19.42	1.30	19.36	0.21	0.24	0.19	0.28	50.50	0.24
Total	-16.10	-8.58	1.25	23.71	0.27	0.17	0.15	0.29	85.32	0.16
Obs	3,523	3,457	3,161	3,584	3,584	3,160	3,584	3,584	3,584	3,582

PANEL B

IQRs	Δ Turnover	Δ Emp	log TFP	Age	Rural	Temp. Workers	Intangible capital	Debt Ratio	Size (Emp)	Cash ratio
Manufacturing	22.50	7.50	0.20	17.00	1.00	0.17	0.04	0.45	65.62	0.16
Construction	22.50	2.50	0.36	16.00	1.00	0.50	0.03	0.48	31.06	0.21
Trade	22.50	7.50	0.17	18.00	1.00	0.18	0.06	0.53	36.00	0.19
Transport	22.50	7.50	0.39	16.00	1.00	0.26	0.02	0.56	43.00	0.16
Hospitality	20.00	52.50	0.23	17.00	1.00	0.30	0.01	0.61	31.80	0.20
IT services	22.50	2.50	0.52	14.00	0.00	0.21	0.96	0.40	63.00	0.33
Real estate	12.50	0.00	0.71	14.00	0.00	0.00	0.00	0.42	2.05	0.14
Prof. services	22.50	2.50	0.36	14.00	0.00	0.15	0.39	0.41	29.88	0.35
Admin. services	40.00	12.50	0.54	17.00	0.00	0.32	0.50	0.53	47.76	0.31
Other services	52.50	40.00	0.50	16.00	0.00	0.30	0.14	0.53	45.00	0.32
Total	22.50	7.50	0.64	17.00	1.00	0.24	0.07	0.51	42.25	0.21
Obs	3,523	3,457	3,161	3,584	3,584	3,160	3,584	3,584	3,584	3,582

Source: EBAE survey and Central de Balances Integrada.
Notes: Panel A shows the averages and Panel B the interquantile ranges (measured as p75-p25 within the industry). The first column of both tables corresponds to yearly change in turnover, and the second column to the yearly change in employment. Column 3, 4 and 5 correspond to log TFP, age of the firm, and the dummy variable indicating the headquarters are in rural areas. Column 6 shows the share of temporary workers. Column 7, 8 and 10 show the share of intangible capital (intangible capital over total capital), the debt ratio (total debt over total assets), and the cash ratio (cash over total assets) respectively. Column 9 shows size, measured by the number of employees.

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[5]Note that the number of observations differs depending on which explanatory variable we look at. We show in Table 8 on Appendix B that the results are qualitatively similar if we keep only the observations for which we have all the regresors of interest (2,715 observations).

qualitatively similar if we use weights to match the sector-size distribution. In light of these figures, it seems crucial to better understand the heterogeneity of the COVID-19 shock and the responses across firms within each sector, something we investigate further in the remaining of the paper.

3   The impact of the COVID-19 shock across firms

In order to assess the impact of COVID-19 on businesses, we rely on question 6 of the survey, which reads as follows: '*How are your firms' turnover and employment in the 4Q20 compared to the same period last year?*'. Note that while turnover is more informative about the size of the shock the firm received, the change in employment is more informative about the reaction of the firm to the shock. The question specifically asked about the total change in employment used, that is, including the extensive margin adjustment (hiring or firing), and the intensive margin adjustment (workers on temporary leave through furlough schemes - ERTEs). There were ten possible answers expressed in intervals, depending on the percentage change decrease/increase. The distribution of responses is shown in Figure 1. A first look at the distribution of the reported year-on-year turnover changes (Panel A) reveals that the bulk of firms declared a negative impact of COVID-19 (63%), while 24% report no change. In contrast, Panel B shows that only 38% of respondents report having decreased their employment, and 54% report no change.[6] These patterns suggest that firms have been able to absorb part of the shock, since their employment decreased less than their sales.

Figure 1: Distribution of responses
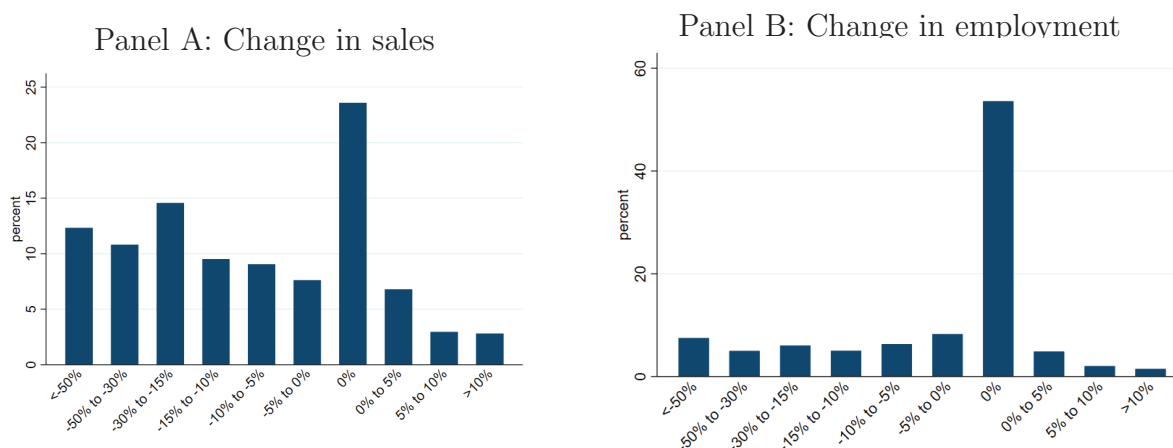
Source: EBAE survey

Notes: Panel A shows the reported year-on-year change in turnover. Panel B shows the reported year-on-year change in employment, taking into account hires/layoffs and workers in a furlough scheme (ERTE)

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[6]This 'inaction range' masks a vast heterogeneity between sectors: while only 16.5% of firms in hospitality services claim a no change in their employment with respect to the previous year, 82% of the firms in the real state sector have been able to sustain their employment. Also, around 10% of the respondents of the survey have 0 employees and most of them claim not having changed their employment.

To analyze the type of firms most impacted by the COVID-19 shock, we investigate which firm characteristics (productivity, age, share of temporary workers, intangible assets share, indebtedness, cash ratio and size) correlate with the fall in activity at the firm level. In particular, our baseline specification consists of a regression of either turnover or employment growth of firm i (y_i) on a vector of firm characteristics (X_i) as well as different configurations of sector s (NACE rev 2-digit) and region j (Autonomous Communities) fixed effects ($\gamma_{s,j}$):

$$y_i = \alpha + \beta' X_i + \gamma_{s,j} + \epsilon_i \tag{1}$$

Table 2 shows the estimation results. The first four columns use sales growth as dependent variable, whereas the last four columns use employment growth. The four columns for each dependent variable differ in the FE configuration considered. Our preferred specifications is the one that includes a full set of sector-region dummies, and thus the identification relies on comparing different firms within the same sector and region (columns 4 and 8).

We start by analyzing the change in turnover reported by firms. Column (4) of Table 2 suggests that firms that are less productive, smaller and urban are the ones that suffered

Table 2: Impact of the COVID-19 shock on firms.

	(1) Δ Turnover	(2) Δ Turnover	(3) Δ Turnover	(4) Δ Turnover	(5) Δ Emp.	(6) Δ Emp.	(7) Δ Emp.	(8) Δ Emp.
TFP	4.74***	2.90**	2.79**	2.90**	3.65***	2.63***	2.47**	2.04**
	(1.20)	(1.18)	(1.16)	(1.23)	(1.08)	(1.01)	(1.00)	(1.01)
Age	0.08**	0.06**	0.04	0.05*	0.08**	0.04*	0.03	0.04
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Rural	3.29***	2.86***	2.66***	2.71***	2.25**	1.62*	1.22	1.52
	(1.08)	(0.87)	(0.90)	(0.97)	(1.02)	(0.85)	(0.89)	(0.93)
Temporary workers (%)	-8.93***	-1.31	-1.17	-1.00	-13.54***	-7.53***	-7.34***	-7.87***
	(2.74)	(1.96)	(2.00)	(2.16)	(2.34)	(1.87)	(1.85)	(1.88)
Intangible Assets (%)	0.09	-1.64	-1.77	-1.34	2.89*	2.11	2.07	1.82
	(1.95)	(1.74)	(1.72)	(1.83)	(1.57)	(1.48)	(1.50)	(1.60)
Debt ratio	-2.00	0.12	-0.22	-0.26	-1.67	0.33	-0.03	0.45
	(1.72)	(1.45)	(1.45)	(1.53)	(1.54)	(1.28)	(1.26)	(1.32)
Cash ratio	-3.48	-1.50	-1.64	-1.22	0.37	2.80	2.75	3.30*
	(2.92)	(2.41)	(2.39)	(2.55)	(2.08)	(1.79)	(1.77)	(1.84)
10-50 emp.	1.09	1.19	1.28	1.16	0.53	0.41	0.59	0.06
	(1.08)	(0.98)	(0.98)	(1.04)	(0.96)	(0.90)	(0.90)	(0.94)
50-250 emp.	6.42***	5.19***	5.34***	4.96***	3.54***	2.48**	2.75***	2.73**
	(1.49)	(1.30)	(1.28)	(1.38)	(1.21)	(1.06)	(1.06)	(1.10)
+250 emp.	6.77***	6.75***	7.75***	8.53***	4.49**	4.25***	5.08***	5.21***
	(2.33)	(1.95)	(2.00)	(2.28)	(1.91)	(1.48)	(1.48)	(1.52)
Observations	2,715	2,715	2,715	2,715	2,715	2,715	2,715	2,715
R^2	0.04	0.27	0.29	0.37	0.05	0.27	0.29	0.39
Sector FE	NO	YES	YES	NO	NO	YES	YES	NO
Region FE	NO	NO	YES	NO	NO	NO	YES	NO
Sect-region FE	NO	NO	NO	YES	NO	NO	NO	YES

Source: EBAE and Central de Balances. Notes: Outcomes of regression (1) using as dependent variable the reported year-on-year change in turnover (columns 1-4) and the reported year-on-year change in employment (columns 5-8) from question 6. Each column differs in the set of fixed effects included. Region-sector clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

most from the shock, reporting the largest decrease in sales. Smaller firms may have suffered more due to the spatial concentration of their activity and the high dependence on their input-output network. Urban firms received a larger shock because they have been more exposed to the strict lockdowns implemented, which were significantly more stringent in cities than in rural areas, at least at the beginning of the pandemic.

Next, we turn to analyze the changes in employment as reported by firms. Column (8) of Table 2 shows that smaller firms with lower TFP report a significantly larger decrease in employment, which aligns with the findings of these firms suffering more from this shock, as showed in column 4. However, two other interesting findings emerge. First, firms with a larger share of temporary workers decrease their employment levels more, pointing at a larger adjustment of employment of these firms due to lower staff adjustment costs.[7] Second, firms with a small cash buffer reduced more their employment. After the lockdowns and the decrease in sales, the first lifeline firms have to restore to is their own cash savings. Firms with more cash have been able to cushion the shock better and needed to restore less to adjusting staff to avoid losses. Interestingly enough, pre-crisis indebtedness levels and the share of intangible assets do not play a significant role in explaining the heterogeneity in the impact of the COVID-19 shock across firms on sales, nor firms' responses to the shock via changes in employment.

Since the data shows that firms have been able to absorb part of the shock (employment declined far less than turnover), we investigate which firms have been more or less able to do so. With this purpose, first we regress the employment change on turnover change, and second we study which firm characteristics predict the inverse of the residual from that regression, which could be interpreted as a measure of the ability of firms to cushion the turnover shock. The results are in Table 12 in Appendix B, and they show that the only firm characteristic that seems to explain the absorption capacity is productivity. Higher TFP firms present lower pass-through of the turnover shock to employment. Lastly, we explore the existence of non-linearities in the turnover-employment relationship by including the turnover change and its square to the baseline specification. Interestingly enough, although small, the square term is strongly significant and indicates that the larger the drop in turnover, the higher the impact on employment (see Table 13 in Appendix B).

Finally, we also explore if the severity of the impact of the COVID-19 shock on firms' activity is correlated with the pre-pandemic trends and capital intensity (see Table 11 in Appendix B). The past evolution of each firm is proxied by the average annual growth rate of both sales and employment over the period 2017-2019, but they are not statistically significant, so we conclude that the role of pre-COVID-19 firm performance is muted. The capital intensity is measured by the capital-to-labor ratio. Firms that

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[7]The Spanish labor market is characterized by its duality, which implies the coexistence of temporary contracts with low firing costs and permanent contracts with high firing costs.

are more capital intensive tend to destroy less employment, as they may have little to gain by decreasing their workforce. In a Cobb-Douglas production function with Hicks neutral technical change, labor productivity can be decomposed in two components: TFP plus capital-to-labor ratio, so that one can interpret this result as evidence that both components of labor productivity play a role in cushioning the impact of the COVID-19 shock.

Summing up, these findings indicate that smaller, less productive and younger firms were hit relatively harder by the COVID-19 shock within each sector and region. We interpret this result as suggestive evidence in favor of the cleansing effects of the COVID-19 shock, typically associated to crisis episodes not only across sectors but also within sectors.

4 Firm-level responses and policy measures in the wake of the COVID-19 shock

4.1 Firm responses to cushion the shock

As explained in the previous section, one obvious margin to adjust when facing the COVID-19 shock is adjusting the employment margin. However, there are other margins firms can adjust to avoid losses (e.g. use of work from home, decreasing investment, restoring to e-commerce, etc...). This section focuses on which margins firms have used to mitigate the COVID-19 shock. We rely on question 7, that reads '*Please indicate the extent to which you are currently using the following measures to cushion the impact of COVID-19 on your business*', followed by a list of measures, and to each there were four possible answers: '*not at all*', '*somewhat relevant*', '*relevant*' and '*very relevant*'. Next, we construct for each measure an indicator, which takes the value of 1 if the firm responded the measure is relevant or very relevant, and 0 otherwise.

Figure 2 shows the percentage of respondents that indicated the measure is relevant or very relevant for them, both for the overall sample (Panel A) and disaggregated by the change in turnover they reported in the previous section (Panel B). Overall, Panel A shows the most used margin is a reduction in investment (38%), followed by the implementation of working from home (WfH, 32%), reinforcing of e-commerce (22%) and firing employees (18%). Note that firing in this question refers strictly to layoffs, while the employment measure studied in detail in the previous sections refers to the reduction of employment used, i.e. layoffs *and* workers included in the furlough schemes. There is heterogeneity depending on the magnitude of the shock received as shown in Panel B: firms that received a larger shock find decreasing investment, firing and the renegotiation of rental contracts more relevant than firms that suffered a lower decrease in turnover. However, e-commerce was implemented more or less symmetrically in all firms, and working from home was implemented more in firms that suffered a *lower* decrease in turnover.

Figure 2: Distribution of firms' responses to COVID-19 shock

Panel A: Overall

Panel B: By change in sales
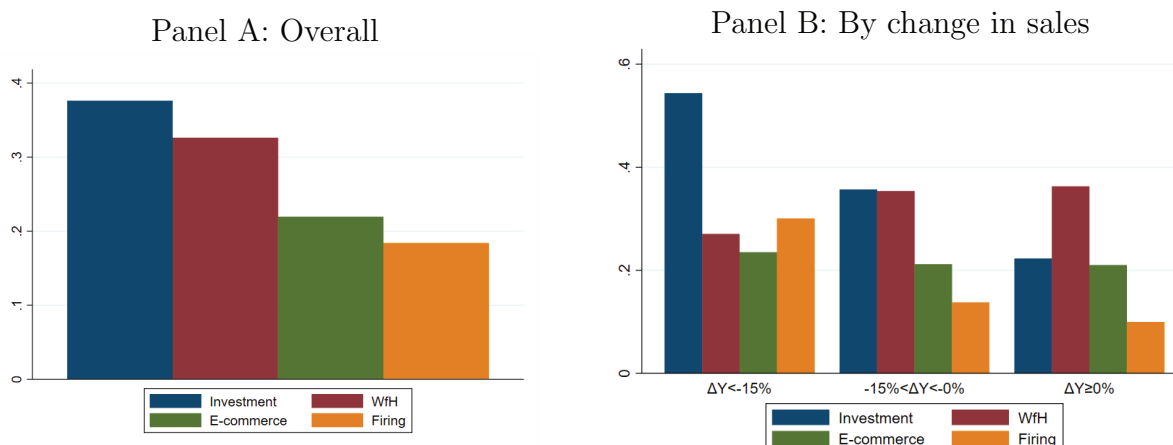
Source: EBAE survey.

Notes: Panel A: Fraction of respondents answering that the margin of adjustment was '*relevant*' or '*very relevant*', where these margins are: reductions in planned investment (Investment - blue), implementation of working from home schemes (WfH - red), reinforcement of e-commerce (E-commerce - green), and firing of workers (Firing - yellow). Panel B: Breakdown of responses shown in Panel A by the size of the shock, measured as the change in year-on-year turnover (ΔY).

Next, we turn to the heterogeneity of these responses. In order to do so, we run the same specification as in the previous section, equation (1), but use as dependent variables the dummies we constructed for each of the responses showed above. We use our preferred specification, i.e. including sector-region fixed effects. Results are shown in Table 3.

Looking at Column (1), within the same sector and region, larger firms used more intensively working-from-home schemes (note that the omitted category is 0-10 employees). Also, for a given size and within the same sector and region, younger firms in urban areas resorted more intensively to WfH schemes. Finally, WfH was also used more intensively by firms with less temporary workers and more intangible capital even after accounting for other factors such as size, sector, geographical location and age.

Column (2) shows that less productive companies reported higher efforts in reinforcing e-commerce. These findings are in line with those of Alfonso et al. (2020). One possible rationale for this finding is that less productive firms used less intensively the e-commerce channel before the pandemic so that the COVID-19 shock induced a within-sector catch-up process of less productive firms with respect to more productive firms that were already using e-commerce even before the pandemic.

Reductions in planned investments, shown in Column (3), were more useful for firms located in rural areas, with lower productivity, and medium-sized (50-250 employees). Finally, Column (4) shows the use of firing as a margin to adjust, where we find the only significant coefficient is the share of temporary workers of the firm. It is interesting to note that very few firms fired workers to adjusts to the shock, and only the temporary share is significant in this regression, which suggests that the adjustment of labor was mainly made along the intensive margin with the use of furlough schemes (ERTEs), something we explore in the next section.

Table 3: Reaction to the COVID-19 shocks.

	(1) WfH	(2) e-COMM	(3) Invest.	(4) Firing
TFP	-0.002	-0.059**	-0.058*	-0.019
	(0.027)	(0.026)	(0.030)	(0.023)
Age	-0.002***	-0.002**	-0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Rural	-0.060***	-0.025	0.058**	0.003
	(0.019)	(0.020)	(0.024)	(0.019)
Temporary workers	-0.224***	-0.071*	-0.050	0.173***
	(0.047)	(0.040)	(0.049)	(0.042)
Intangible share	0.172***	0.062	0.052	-0.032
	(0.046)	(0.051)	(0.053)	(0.044)
Debt ratio	-0.046	0.004	0.043	0.008
	(0.035)	(0.030)	(0.035)	(0.027)
Cash ratio	-0.073	0.036	-0.047	0.003
	(0.050)	(0.053)	(0.060)	(0.049)
Employees = 2, 10-50 emp.	0.044*	0.003	-0.016	0.019
	(0.025)	(0.021)	(0.023)	(0.020)
Employees = 3, 50-250 emp.	0.190***	0.042	-0.057**	0.009
	(0.032)	(0.028)	(0.028)	(0.027)
Employees = 4, +250 emp.	0.304***	-0.010	0.013	-0.041
	(0.044)	(0.045)	(0.052)	(0.038)
Observations	2,715	2,715	2,715	2,715
R^2	0.327	0.191	0.167	0.200
SectXreg FE	YES	YES	YES	YES

Source: EBAE survey and Central de Balances.

Notes: Outcomes of regression (1) using as dependent variable a dummy that takes the value 1 if the firm perceives as very relevant or relevant working from home schemes (column 1), reinforcing of e-commerce (column 2), the reduction in planned investment (column 3) and the firing of workers (column 4). The regression includes a full set of sector-region fixed effects. Region-sector clustered standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

## 4.2 Usefulness of policy support measures across firms

Given the magnitude of the COVID-19 shock, the Spanish government have put in place several policy measures with the aim of helping firms in distress due to the pandemic. First, it has implemented a scheme of state-guaranteed credit through the Instituto de Crédito Oficial (ICO), a Spanish state-owned bank. Second, it has implemented a furlough scheme through which, for eligible firms that apply for it, social security provides furloughed workers with 70 percent of their base salary for the first six months, before dropping to 50 percent for the following months, without the need of firing them (Expediente de Regulación Temporal de Empleo, or ERTE).[8] Other policy measures include

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[8]Those companies that take part in the scheme are banned from making layoffs in the six months after it ends.

tax deferral schemes, and regulation making it easier for firms to renegotiate rentals. In this section, we want to explore which firms used these policy tools more intensively, and hence gauge its effectiveness.

For this purpose, we also use question 7 as in the previous section, where these policy measures were listed along with the other firm level measures. We create dummies that take the value of one if the policy measure was relevant or very relevant for the firm, and zero otherwise. Figure 3 shows the distribution of responses. Panel A shows ICO loans are the policy measure deemed more useful, with nearly 43% of respondents stating it was very helpful to deal with the COVID-19 shock, followed by ERTEs (29%), tax deferrals (24%) and renegotiation of rental payments (21%). Firms with a larger decline in sales use all these tools more intensively (Panel B), especially ERTEs.

Figure 3: Distribution of usefulness of policy support measures

Panel A: Overall

Panel B: By change in turnover
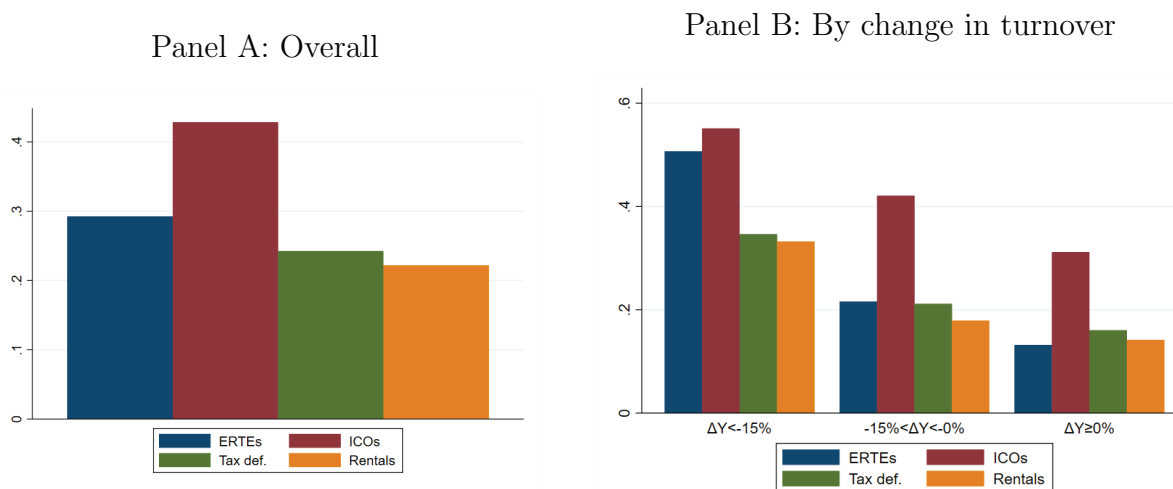
Source: EBAE survey.

Notes: Panel A: Fraction of respondents answering that the policy tool was relevant or very relevant, where policy tools are: furlough schemes (ERTEs - blue), state-guaranteed credit (ICOs - red), tax deferrals (Tax def. - green), and renegotiation of rental contracts (Rentals - yellow). Panel B: Breakdown of responses shown in Panel A by the size of the shock, measured as the change in year-on-year turnover (ΔY).

Looking now at the heterogeneity, we perform again regression (1), using as dependent variables the dummies that take the value 1 if the firm finds the policy tool relevant or very relevant in the alleviation of the COVID-19 shock. Table 4 shows the result of our preferred specification, that is, with a full set of sector-region fixed effects.

Turning to ERTEs in column (1), they are deemed as especially useful for medium-sized firms (10-250 employees) but less so for very small (0-10 employees) and very large (+250 employees) firms. Also, less productive and urban firms resorted relatively more to ERTEs than more productive firms in rural areas. It is notable that we do not find that firms with a higher share of temporary workers make more use of ERTEs, but we did find in section 4.1 that firms with a higher temporary share found layoffs more useful as a margin to adjust to the shock. Hence, while ERTEs have been a useful tool to

cushion the shock for firms, they have not been able to protect employment of temporary workers. This finding is in line with the results of similar policies implemented in the Great Recession (Hijzen & Venn (2011)).

ICO loans (loans with public guarantees), shown in column (2), were perceived as less useful for larger companies within each sector-region pair. Firms with larger cash buffers find this tool less useful: since they have more internal resources to face the shock, they rely less on external financing. Interestingly enough, for a given region, sector and firm size, these public-guaranteed loans were more useful for less productive, younger, and more indebted companies. There may be demand and supply reasons to account for this finding. On the demand side, highly indebted firms may have the incentive of taking on more loans due to the higher risk of liquidity shortfalls if the pandemic lasts longer than

Table 4: Policy measures to support firms.

	(1) ERTEs	(2) ICOs	(3) Tax def.	(4) Rentals.
TFP	-0.050*	-0.081**	-0.033	-0.077***
	(0.027)	(0.035)	(0.026)	(0.028)
Age	-0.001	-0.002***	-0.002***	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Rural	-0.052**	-0.034	-0.028	-0.033*
	(0.024)	(0.025)	(0.019)	(0.019)
Temporary workers	0.044	0.165***	0.088**	0.096**
	(0.049)	(0.054)	(0.044)	(0.044)
Intangible share	-0.016	0.033	0.008	0.027
	(0.051)	(0.050)	(0.042)	(0.036)
Debt ratio	0.037	0.317***	0.062*	0.004
	(0.035)	(0.040)	(0.033)	(0.036)
Cash ratio	-0.060	-0.389***	-0.254***	0.070
	(0.051)	(0.062)	(0.055)	(0.049)
10-50 emp.	0.072***	0.051*	-0.054**	-0.056**
	(0.022)	(0.028)	(0.026)	(0.023)
50-250 emp.	0.063**	-0.028	-0.168***	-0.068***
	(0.031)	(0.034)	(0.025)	(0.026)
+250 emp.	0.031	-0.303***	-0.218***	-0.130***
	(0.047)	(0.046)	(0.042)	(0.045)
Observations	2,715	2,715	2,715	2,715
R^2	0.266	0.261	0.235	0.212
SectXreg FE	YES	YES	YES	YES

Source: EBAE survey and Central de Balances.
Notes: Outcomes of regression (1) using as dependent variable a dummy that takes the value 1 if the firm perceives as very relevant or relevant furlough schemes (ERTEs - column 1), state-guaranteed loans (ICOs - column 2), tax deferrals (Tax def. - column 3), and renegotiation of rental contracts (Rentals - column 4). The regression includes a full set of sector-region fixed effects. Region-sector clustered standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

expected. On the supply side, banks may be more willing to provide loans to clients with high outstanding exposure, thus providing a liquidity cushion against potential short-term defaults on banks' loans.[9] This is in line with the findings of Brülhart et al. (2020) for Swiss firms.

Similar patterns are observed in column (3) for tax deferrals, with the exception that there is no distinction between more/less productive firms in its use. Finally, renegotiation of rental payments was more useful for less productive, small and urban firms, and those with a higher share of temporary workers (column (4)).

Overall, we find that the policies implemented in order to mitigate the impact of the shock have been more widely used by smaller and less productive firms, with a larger share of temporary workers, high debts levels and low cash buffers, although we find substantial heterogeneity depending on the measure.

5   Factors conditioning firms' activity

We have documented the heterogeneity of the COVID-19 shock even within sector and region. In this section, we aim to understand which are the factors of the shock that are affecting firms the most. To this purpose, we use question 5, which reads '*How have the following factors affected your firm's activity?*'. There was a list of factors, and to

Figure 4: Distribution of main factors conditioning firms' activity due to COVID-19 shock
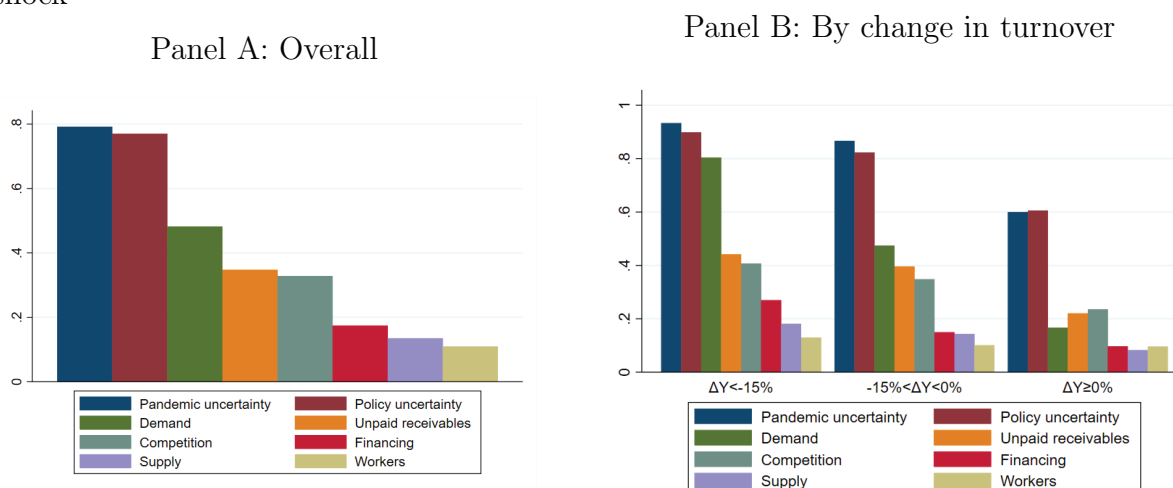
Source: EBAE survey.

Notes: Panel A: Fraction of respondents answering that the factor affected firms' activity negatively or very negatively, where these factors are: pandemic uncertainty (blue), policy uncertainty (red), demand disruptions (green), unpaid receivables (yellow), competition pressures (grey), problems accessing financing (bright red), supply disruptions (purple) and availability of workers (beige). Panel B: Shows the breakdown of responses shown in Panel A by the size of the shock, measured as the change in year-on-year turnover (ΔY).

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[9]Disentangling each of these mechanisms is outside the scope of this paper.

each of them, five possible answers: '*very negative*', '*negative*', '*neutral*', '*positive*' and '*very positive*'. We also convert these variables into dummies, taking the value of one if the answer was very negative or negative, and zero otherwise. Table 4 shows the summary statistics of these responses. Panel A shows that uncertainty is the factor conditioning firms' activity the most, with nearly 80% of firms stating pandemic uncertainty was affecting their activity negatively, followed by policy uncertainty (77%). The next factor in importance is the evolution of demand (48%), unpaid receivables (34%) and competition pressures (33%), followed by problems accessing financing (17%), disruptions in supply (13%) and availability of workers (10%). Looking at which factors affect more firms depending on the fall in their turnover (Panel B of Figure 4), political and pandemic uncertainty still are the most important negative factor. For firms suffering the largest drop in turnover, demand is a very relevant factor, while it is less so for firms receiving a smaller shock.

Given the utmost importance of uncertainty of the COVID-19 shock, we will devote the next section entirely to explore this margin. Appendix C shows the result of regression (1), where the dependent variable is the dummy response for each of the factors. Rural and large businesses were less affected by demand factors. Larger firms are less affected by problems related to accessing financing, while firms that were previously indebted find that this factor affected them more negatively. This is in line with the findings in the previous section that more indebted companies are more likely to ask for loans with public guarantees (ICOs). Supply disruptions affect less negatively large and more productive firms, while firms with larger cash holdings find this factor affects them more negatively. Increased competition affects less negatively large, indebted and productive firms.

5.1 The role of uncertainty

The COVID-19 shock brought about an unprecedented increase in uncertainty. The sources of this uncertainty are wide ranging. First, on the epidemiological side, uncertainties include the infectiousness of the virus, the development and effectiveness of vaccines, the magnitude of the successive waves of COVID-19, the appearance of new virus strains and the duration and effectiveness of social distancing. Second, on the economic side, the unprecedented nature of the shock creates an uncertain outlook related to the short-term impact of containment measures on business activity, the policy measures and their impact on the economy, the speed of the recovery and the changes in households' spending patterns, among others. Because of this, as shown in the previous section, firms perceive uncertainty as the main factor affecting negatively their activity.

We begin the analysis of heterogeneity running the same regression as before, equation 1, but adding now a set of week dummies (in order to control for the response date as new information about the evolution of pandemic may affect the perception of uncertainty) and the year-on-year change in turnover (in order to account for the magnitude

of the firm-specific shock that may also affect the perception of uncertainty). Results are shown in Table 5. We use as dependent variable the responses dealing with uncertainty from question 5 we used in the previous section, i.e. using dummies that take the value 1 if the firm perceives that economic and policy uncertainty affected negatively their activity (columns (1) and (2) respectively of Table 5). We complement it with the answers to question 8, which reads '*When will your firm's activity return to pre-crisis levels?*'. We construct a dummy that takes the value 1 if the firm replied 'too uncertain' to this

Table 5: Reaction to the COVID-19 shock.

	(1) Pandemic uncertainty	(2) Policy uncertainty	(3) Recovery uncertainty
Δ Turnover	-0.005***	-0.004***	-0.008***
	(0.000)	(0.001)	(0.001)
TFP	-0.007	-0.023	-0.039
	(0.028)	(0.032)	(0.031)
Age	0.000	-0.001*	0.002*
	(0.001)	(0.001)	(0.001)
Rural	-0.012	-0.024	0.022
	(0.023)	(0.025)	(0.026)
Temporary workers	0.004	0.027	0.069
	(0.045)	(0.046)	(0.061)
Intangible share	0.056	-0.052	-0.041
	(0.039)	(0.048)	(0.056)
Debt ratio	-0.021	-0.039	-0.049
	(0.035)	(0.037)	(0.047)
Cash ratio	-0.039	-0.112*	0.008
	(0.066)	(0.066)	(0.075)
10-50 emp.	0.014	0.008	-0.022
	(0.023)	(0.027)	(0.027)
50-250 emp.	0.031	-0.008	-0.049
	(0.029)	(0.038)	(0.038)
+250 emp.	-0.037	-0.160**	-0.053
	(0.060)	(0.071)	(0.064)
Observations	2,032	2,032	2,032
R^2	0.206	0.198	0.268
SectXreg FE	YES	YES	YES
Week FE	YES	YES	YES

Source: EBAE survey and Central de Balances.
Notes: Outcomes of regression (1) using as dependent variable a dummy that takes the value 1 if the firm perceives that pandemic and political uncertainty is impacting its activity negatively or very negatively (columns 1 and 2 respectively), or if the firms states that there is too much uncertainty to ascertain the time of recovery (column 3). Regressors include size of the shock, proxied by the year-on-year change in turnover, and firm observable characteristics (TFP, age, share of temporary workers, share of intangible assets, debt ratio, cash ratio and size bins).The regression includes week fixed effects, a full set of sector-region fixed effects. Region-sector clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

question, and zero otherwise. The regression with this variable as dependent variable is shown in column (3) of Table 5.

Turning to uncertainty associated to the pandemic and to policy measures (columns (1) and (2), respectively), it is surprising that there are no significant differences on observable characteristics across firms within each sector-region-week triplet beyond the size of the shock. This finding implies that all firms are equally exposed to these sources of uncertainty regardless of their characteristics once we control for the change in turnover. Only the very large firms (+250 employees) show a lower concern about the economic policy uncertainty. Regarding the length of the recovery (column (3)), only the size of the shock (proxied by the year-on-year change in turnover) is associated to the presence of too much uncertainty in the timing of the recovery. Within each sector, region and week of response, old firms are also more prone to answer that uncertainty is too large to provide a meaningful answer.

Summing up, once we control for the size of the shock (proxied by the change in turnover), our results suggest that all firms were impacted homogeneously by the uncertainty brought by the COVID-19 shock, since we find no significant differences across firms' observables in their perception of uncertainty.

6 The impact of the vaccine announcement on firms' subjective recovery expectations

On November 9th 2020, Pfizer announced that their COVID-19 vaccine was 90% effective in trials.[10] The markets and most economic agents took these news as an indication of the pandemic being closer to an end, stocks market spiked,[11] and news all over the world spread the word that the end of the COVID-19 pandemic was a bit closer. Figure 5 shows the interest in the word vaccine (and related words) on Google searches during the period the survey was open. We can observe a clear spike on the 9th of November, the day the vaccine was announced, which supports the exogeneity of the shock. Our survey was conducted between the 5th and the 18th of November 2020, so we use the fact that Pfizer's announcement was made while the survey was open as an identification strategy to provide causal evidence of the impact of the announcement of the vaccine on firms' recovery expectations.[12]

To this end, we use again question 8, which asks when the firm will recover pre-pandemic activity levels, in order to create two different expected recovery measures to use as dependent variable (y_{it}). First, a dummy taking value 1 when the firm reports a
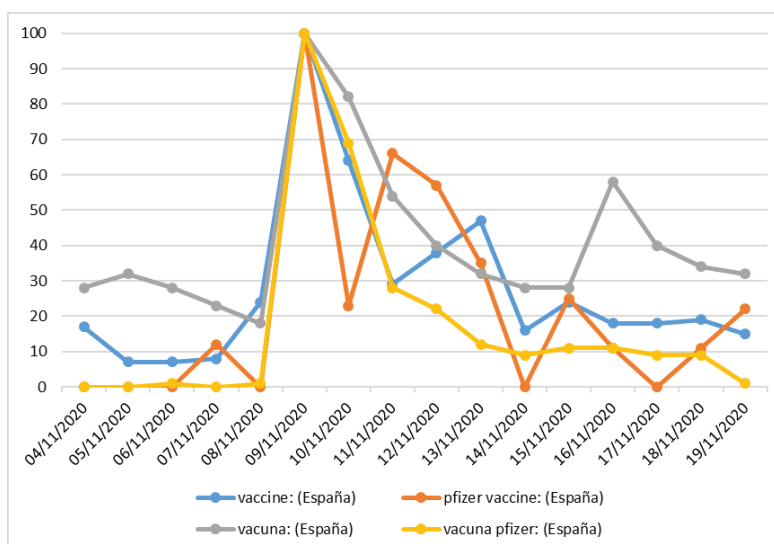
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[10]The announcement was made in the afternoon in Europe.
[11]Daily returns in Europe on November 9th 2020: IBEX 35 (+8.57%), DAX (+4.94%), CAC 40 (+7.57%), FTSE 100 (+4.67%), Euro Stoxx 50 (+6.42%).
[12]Figure 10 of Appendix A.1 shows the responses received by day.

Figure 5: Google searches of the word 'vaccine'

Notes: The figure shows the 'regional interest' in Spain of the searches *vaccine*, *pfizer vaccine*, *vacuna* and *vacuna pfizer* (the two latter are the Spanish translations of the former). Regional interest is computed by Google as a proportion of all searches on all topics on Google at that time and location, normalized so that 100 is the maximum.

full recovery by the end of 2021. Second, an ordinal variable that captures the timing of the recovery, taking values 1, 2, 3, 4 and 5 if the firm expects recovery "already", in 2020, 2021, 2022 and later than 2022, respectively (excluding firms that answered '*too uncertain*' and '*already recovered*').
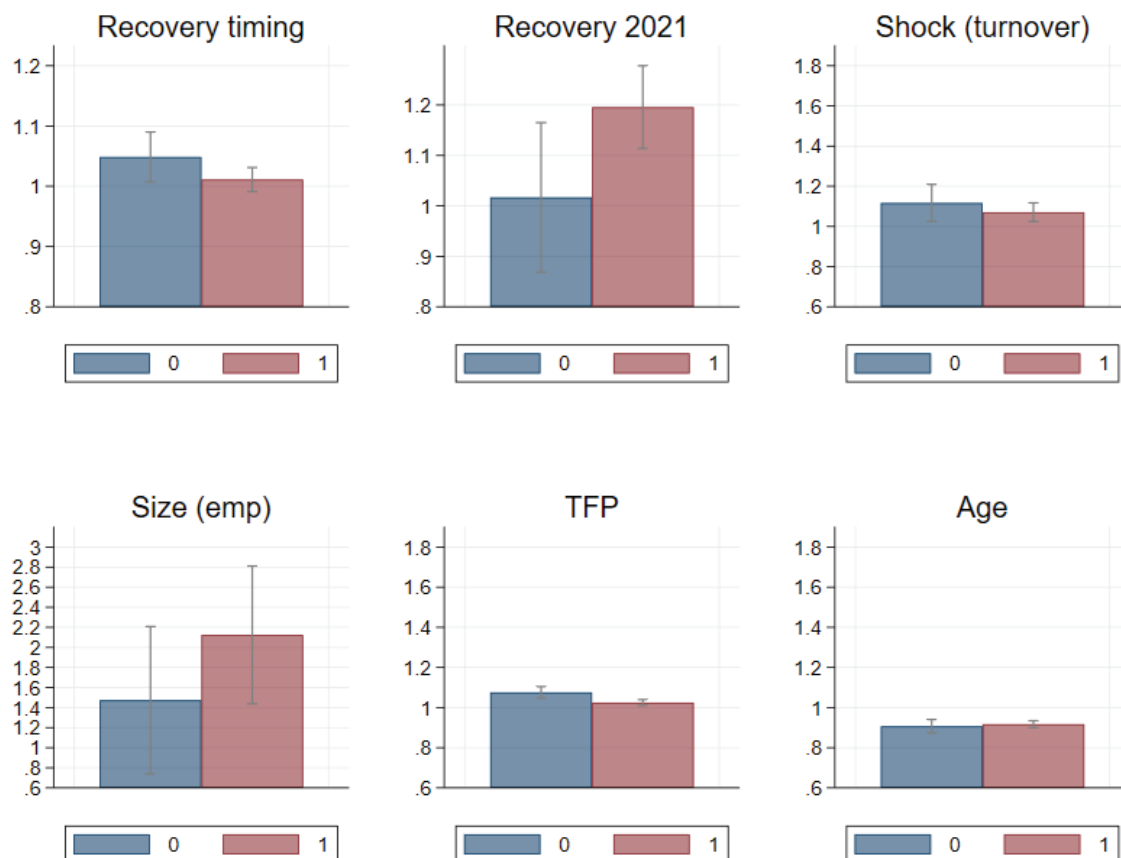
In order to estimate the impact of the vaccine news on these firm-level recovery expectations proxies, we consider the following regression:

$$y_{it} = \alpha + \varphi vaccine_{it} + \beta' X_i + \gamma_{s,j} + \epsilon_{it}, \tag{2}$$

where the regressor of interest, $vaccine_{i,t}$, takes the value of 1 if the firm submitted its response after the vaccine news on November 9th and 0 otherwise. We also introduce a set of controls X_i, which includes change in turnover, size, productivity, temporary workers' share, intangible assets share, rural/urban dummy, cash ratio and indebtedness; and a full set of week and sector-region FE ($\gamma_{s,j}$). Identification is based on comparing firms with the same observable characteristics operating in the same sector and region, but answering before the vaccine announcement on Nov 9th (control group) and those interviewed after the announcement (treatment group).

Figure 6 shows the average response pre-vaccine (0) and post-vaccine (1) with the 90% confidence interval, of the variables proxying recovery expectations (*recovery timing* and *recovery in 2021*), the size of the shock received (proxied by the decrease in turnover) and the main firm characteristics (employment, age and TFP). We can observe that firms were more likely to respond that they expected to have recovered by 2021 after

Figure 6: Average of responses before and after the vaccine announcement.

the announcement of the vaccine, and that they expected a shorter time for recovery. However, firm characteristics are in general not significantly different before and after the vaccine. To further ease concerns that firms responding later in the survey might have different characteristics, and this might be driving the results, we regress the dummy $vaccine_{i,t}$ on each of the regressors of interest adding a full set of sector-region fixed effects (see Table 6). We find that all of them have no significant correlation with the timing of the response (with the exception of the cash ratio, which has a positive and significant coefficient), hence pointing at the pool of firms responding before and after the announcement of the vaccine to have the same ex-ante characteristics. Nonetheless we control by all firm observables and the size of the shock received when running equation (2) to minimize any possible concern regarding the correlation of the timing of the response with any firm-level characteristics.

Table 6: Relationship of the timing of response to survey with the regressors of interest

	(1) Δ Turnover	(2) TFP	(3) Age	(4) Temp. workers	(5) Intang. share	(6) Debt ratio	(7) Cash ratio	(8) Log Empl.
vaccine	0.79	-0.03	-0.07	0.00	0.01	0.02	-0.03***	0.04
	(1.06)	(0.02)	(0.87)	(0.01)	(0.01)	(0.02)	(0.01)	(0.08)
Obs	2,119	2,119	2,119	2,119	2,119	2,119	2,119	2,119
R^2	0.37	0.62	0.24	0.34	0.26	0.18	0.21	0.30
Sect-reg FE	YES	YES	YES	YES	YES	YES	YES	YES

Source: EBAE survey and Central de Balances.
Notes: Outcomes of regressing the dummy variable $vaccine_{i,t}$ individually on the Y-o-Y change in turnover, proxy for the size of the shock (column 1), TFP (column 2), age (column 3), share of temporary workers (column 4), share of intangible assets (column 5), debt ratio (column 6), cash ratio (column 7) and log employment (column 8). All columns include full set of sector-region fixed effects. Region-sector clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7 shows the main results.[13] Column (1) shows that firms answering after the announcement date of the vaccine report a significantly higher probability of full recovery expectations by the end of 2021 than firms answering before, even after accounting for firm characteristics within the same sector-region pair. Answering after the vaccine announcement increases the probability of expected recovery by the end of 2021 in 6.6 pp. Since the average of the dependent variable is 20%, it means that the expected probability would increase from 20% to 26.6% in the average firm as a result of the announcement. This effect is equivalent in magnitude to the effect of a change in turnover (size of the shock) of 16.5 pp. (0.06 / 0.004).

Column (2) runs the same regression as column (1), but adding a linear time trend to capture any trend in recovery expectations other than the vaccine announcement.[14] We see that the coefficient is still significant and of similar magnitude. Since other news while the survey was taking place might have also impacted firms' recovery expectations, we narrow down the time span and consider only responses submitted three days before and three days after the announcement date, i.e. between November 06 and 12. Column (3) shows that the impact is still positive and significant, and even of larger magnitude. Column (4) of Table 7 shows the impact of the vaccine announcement on the timing of the recovery. The coefficient is negative and significant, meaning that firms expect a shorter recovery time after the vaccine announcement.

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[13]Figure 15 of Appendix B shows all the coefficients of Table 7.

[14]The linear time trend is added to control for any trends brought by other information about the evolution of pandemic that may affect the recovery expectations. This time trend is a variable that takes the value 1 for the first day of the survey, 2 for the second, and so on. Since there are two weekends in our sample, we assign the (very few) responses received on weekends to Friday, and take into account only work days (from Monday to Friday).

Table 7: The impact of the COVID-19 vaccine on firms' recovery expectations.

	(1) Recovery 2021	(2) Recovery 2021	(3) Recovery 2021	(4) Recovery timing
vaccine	0.066***	0.074*	0.0823***	-0.266***
	(0.022)	(0.042)	(0.035)	(0.090)
Δ turnover	0.005***	0.005***	0.004***	-0.039***
	(0.001)	(0.001)	(0.001)	(0.002)
Observations	1,565	1,565	617	944
R^2	0.263	0.263	0.276	0.482
Sample	4-19 Nov	4-19 Nov	6-12 Nov	4-19 Nov
Controls	YES	YES	YES	YES
SectXreg FE	YES	YES	YES	YES
Time trend	NO	YES	NO	NO

Source: EBAE survey and Central de Balances.
Notes: Outcomes of regression (2) using as dependent variable a dummy taking value 1 when the firm reports a full recovery by the end of 2021 (columns 1, 2 and 3); an ordinal variable that captures the timing of the recovery, taking values 1, 2, 3, 4 and 5 if the firm expects recovery "already", in 2020, 2021, 2022 and later than 2022, respectively (column 4). The variable *vaccine* takes the value 1 if the firm replied after the vaccine announcement on November 9th 2020, and 0 otherwise. The regression includes a full set of sector-region, controls for the size of the shock, proxied by the year-on-year change in turnover, and for all the observables we have been using in the previous sections: size, age, TFP, rural status, temporary workers, intangible share, debt and cash ratio. Column 2 also includes a linear time trend. Region-sector clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Summing up, this section exploits the announcement of the effectiveness of Pfizer's vaccine during the EBAE survey to show that the vaccine announcement increased recovery expectations of all firms, hence providing evidence that during a pandemic firms incorporate developments in the medical field into their expectations formation.

7 Conclusions

The COVID-19 pandemic and its associated containment measures are causing an unprecedented economic shock. The threat of COVID-19 poses many challenges for firms in an uncertain and volatile environment. In particular, the COVID-19 shock is generating negative cash flows for many firms, exhausting in some cases their liquidity stocks. In case these shortages result in a significant increase of firm insolvencies and bankruptcies, their potential long-term effects on employment, investment, growth and prosperity are a source of concern. Against this background, the objective of this paper is to provide a better understanding of the firm-level heterogeneity in the impact of and response to the COVID-19 shock, a matter of paramount importance.

Our first contribution is to exploit the Banco de España's EBAE survey matched to balance sheet data from *Central de Balances* in order to dig deeper into the heterogeneity

in the COVID-19 shock consequences across firms. We show that this impact was larger in the case of small, young and less productive firms located in urban areas within each sector-region pair. Firms did not translate fully the decrease in turnover experienced to employment, and used relatively more the intensive margin (using temporary furlough schemes - ERTEs) than the extensive margin (layoffs), with the exception of firms with a high share of temporary workers. Small, young and less productive firms resorted relatively more to public-guaranteed loans (ICO loans), tax deferrals, and furlough schemes (ERTEs). More indebted companies, which were not hit relatively harder by the shock, deemed public-guaranteed loans as very useful.

Our second contribution relates to firms' perception regarding a) pandemic and policy uncertainty, and b) recovery expectations. Uncertainty turns out to be the main factor limiting firms' activity. We show that uncertainty is crucial for all firms and that observables cannot explain the differences in uncertainty perceptions once the shock is accounted for. Given the timing of the survey, we use the announcement of the effectiveness of the Pfizer vaccine on November 9th 2020 as a natural experiment to understand the impact of the vaccine announcement on firms' recovery expectations. We provide causal evidence that this piece of news significantly improved the prospects of faster recovery of faster recovery under different set of measures, hence providing evidence that during a pandemic firms incorporate developments in the medical field into their expectations formation.

References

Albert, Christoph, Andrea Caggese, and Beatriz González, "The short-and long-run employment impact of Covid-19 through the effects of real and financial shocks on new firms," *Banco de España, Working Paper*, 2020.

Alfonso, Viviana, Codruta Boar, Jon Frost, Leonardo Gambacorta, and Jing Liu, "E-commerce in the pandemic and beyond," *BIS Bulletin*, 2020.

Almunia, Miguel, David Lopez Rodriguez, and Enrique Moral-Benito, "Evaluating the macro-representativeness of a firm-level database: an application for the Spanish economy," *Banco de España, Documentos Ocasionales*, 2018, (1802).

Altig, Dave, Scott Baker, Jose Maria Barrero, Nicholas Bloom, Philip Bunn, Scarlet Chen, Steven J Davis, Julia Leather, Brent Meyer, Emil Mihaylov et al., "Economic uncertainty before and during the COVID-19 pandemic," *Journal of Public Economics*, 2020, *191*, 104274.

Apedo-Amah, Marie Christine, Besart Avdiu, Xavier Cirera, Marcio Cruz, Elwyn Davies, Arti Grover, Leonardo Iacovone, Umut Kilinc, Denis Medvedev, Franklin Okechukwu Maduko et al., "Unmasking the impact of covid-19 on businesses: firm level evidence from across the world," 2020.

Balduzzi, Pierluigi, Emanuele Brancati, Marco Brianti, and Fabio Schiantarelli, "The Economic Effects of COVID-19 and Credit Constraints: Evidence from Italian Firms' Expectations and Plans," *IZA Discussion Paper*, 2020.

Barrero, Jose Maria and Nick Bloom, "Economic uncertainty and the recovery," *Unpublished manuscript*, 2020.

_ , Nicholas Bloom, and Steven J Davis, "Covid-19 is also a reallocation shock," *National Bureau of Economic Research*, 2020.

Bartik, Alexander W, Marianne Bertrand, Zoë B Cullen, Edward L Glaeser, Michael Luca, and Christopher T Stanton, "How are small businesses adjusting to COVID-19? Early evidence from a survey," *National Bureau of Economic Research*, 2020.

Bennedsen, Morten, Birthe Larsen, Ian Schmutte, and Daniela Scur, "Preserving job matches during the COVID-19 pandemic: firm-level evidence on the role of government aid," *GLO Discussion Paper*, 2020.

Blanco, Roberto, Sergio Mayordomo, Álvaro Menéndez, and Maristela Mulino, "Las necesidades de liquidez y la solvencia de las empresas no financieras españolas tras la perturbación del Covid-19," *Banco de España, Documentos Ocasionales*, 2020.

Bloom, Nicholas, Philip Bunn, Paul Mizen, Pawel Smietanka, and Gregory Thwaites, "The impact of Covid-19 on productivity," Technical Report, National Bureau of Economic Research 2020.

_ , Robert S Fletcher, and Ethan Yeh, "The Impact of COVID-19 on US Firms," *National Bureau of Economic Research*, 2021.

Brotherhood, Luiz and Vahagn Jerbashian, "Firm Behavior during an Epidemic," *CESifo Working Paper*, 2020.

Brülhart, Marius, Rafael Lalive, Tobias Lehmann, and Michael Siegenthaler, "COVID-19 financial support to small businesses in Switzerland: evaluation and outlook," *Swiss journal of economics and statistics*, 2020, *156* (1), 1–13.

Buchheim, Lukas, Jonas Dovern, Carla Krolage, and Sebastian Link, "Sentiment and Firm Behavior During the COVID-19 Pandemic," *Working Paper*, 2020.

Chetty, Raj, John Friedman, Nathaniel Hendren, Michael Stepner et al., "How did covid-19 and stabilization policies affect spending and employment? a new real-time economic tracker based on private sector data," *NBER working paper*, 2020, (w27431).

Gonzalez-Uribe, Juanita and Su Wang, "The effects of small-firm loan guarantees in the UK: insights for the COVID-19 pandemic crisis," *Available at SSRN 3382280*, 2020.

Goodhart, Charles, Dimitrios P Tsomocos, and Xuan Wang, "Support for small businesses amid COVID-19," *Tinbergen Institute Discussion Paper 2020-044/IV*, 2020.

Greenwald, Daniel L, John Krainer, and Pascal Paul, "The credit line channel," *Working Paper, Federal Reserve Board of San Francisco*, 2020.

Guerrieri, Veronica, Guido Lorenzoni, Ludwig Straub, and Iván Werning, "Macroeconomic implications of COVID-19: Can negative supply shocks cause demand shortages?," *National Bureau of Economic Research*, 2020.

Heap, Shaun P Hargreaves, Christel Koop, Konstantinos Matakos, Asli Unan, and Nina Sophie Weber, "Good news for whom? The Pfizer/BioNTech vaccine announcement reduced political trust," *Center for Open Science*, 2021.

Hijzen, Alexander and Danielle Venn, "The role of short-time work schemes during the 2008-09 recession," *OECD*, 2011.

Humphries, John Eric, Christopher Neilson, and Gabriel Ulyssea, "The evolving impacts of COVID-19 on small businesses since the CARES Act," *Cowles Foundation Discussion Paper*, 2020.

Schivardi, Fabiano and Romano Guido, "A simple method to estimate firms' liquidity needs during the Covid-19 crisis with an application to Italy," *CEPR (Centre for Economic Policy Research) Press*, 2020.

Sedlacek, Petr and Vincent Sterk, "Startups and employment following the COVID-19 pandemic: A calculator," *CEPR Discussion Paper No. DP14671*, 2020.

Turner, J and T Akinremi, "The business effects of pandemics—A rapid literature review," *Enterprise Research Centre*, 2020.

Zoller-Rydzek, Benedikt and Florian Keller, "COVID-19: guaranteed loans and zombie firms," *CESifo Economic Studies*, 2020, *66* (4), 322–364.
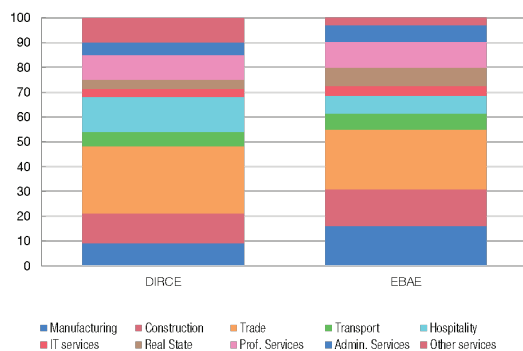
Appendix

A. Survey

A.1. Coverage and representativeness

The survey was submitted to a sample of 12,940 Spanish non-financial corporations, of which 46% cooperate regularly with the Banco de España's Central Balance Sheet Data Office (CBBE). The survey focuses on the non-financial market economy, hence, we exclude firms in the following sectors: agriculture, utilities, financial services and non-market services. Figure 7 show the sectoral distribution of the sample of firms that received the survey compared to the one observed in the economy, using the information from the Central Business Register (DIRCE in Spanish), available at the National Statistics Institute (INE). It can be shown that the sectoral distribution of the sample partially over-represents some sectors of the economy, mainly manufacturing, which reflects the higher coverage of this sector in the CBBE.

Figure 7: Comparison of sectoral distribution in the original sample

Panel B: Response rates by sector

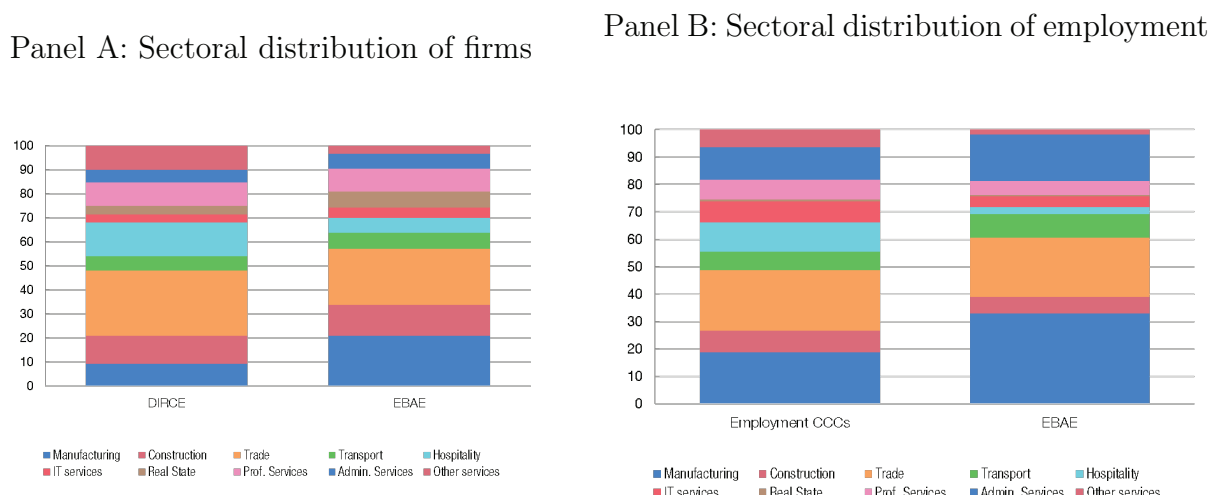Panel A: Sectoral distribution of firms in the original sample
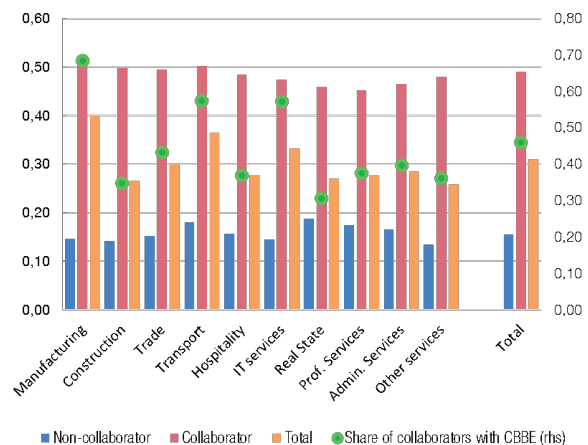
Source: INE and Banco de España

Notes: Panel A shows the sectoral distribution of firms in the Spanish economy according to DIRCE (left column), and the sectoral distribution of our original sample of firms from the EBAE survey (right column). Panel B shows the response rate and the degree of collaboration with the CBBE by sector.

Out of these, we received 4,004 valid responses, which represents a response rate of 30,9%. As expected, the response rate was higher among the companies that collaborate with the CBBE (49%) than among those that have not been collaborated to date (15.5%). Figure 8 compares the sectoral distribution of the final sample of the survey with the one observed in DIRCE. There is some over-representation of the manufacturing sector (see Panel A), which is slightly lower when we compare the employment distribution by sector using the information from Social Security Registers (Panel B).

Figure 8: Comparison of sectoral distribution in the final sample

Panel A: Sectoral distribution of firms

Panel B: Sectoral distribution of employment

Source: INE, Ministry of Social Security and Banco de España

Notes: Panel A shows the sectoral distribution of firms in the Spanish economy according to DIRCE (left column), and the sectoral distribution of our final sample of firms from the EBAE survey (right column). Panel B shows the sectoral distribution of employment in the Spanish economy according to social security data (left column), and the sectoral distribution of employment of our final sample of firms from the EBAE survey (right column).

Turning to representativeness in terms of firm size, the survey over-represents large firms. In particular, the shares of very small (1-9 employees), small (10-49), medium (50-249), and large (+250) firms in the sample are 36.5%, 40.2%, 18.5%, and 4.8%, respectively. According to DIRCE, the corresponding shares in the population of Spanish firms are 85.7%, 12.0%, 1.9%, and 0.4%. It is worth mentioning that this under-representation of small firms is not a source of concern for our main results because of two reasons: (i) Identification in our preferred specifications comes from variation within each sector-region pair and size bin. For instance, in the case of impact of the shock, we compare the drop in sales of two firms with different TFPs but operating in the same sector-region and the same size category. (ii) Still, the concern could be that the survey over-represents high-TFP / good firms within the small size categories because low-TFP / bad firms are not even able to answer the survey properly or they are in distress. If this is the case, our estimated differences could be considered a lower bound to the extent that these missing firms are presumably more negatively affected by the COVID-19 shock.

In any event, survey responses aggregated at the sectoral and regional level capture well the recent developments in the Spanish economy. For instance, Figure 9 shows that survey figures on employment growth are highly correlated with those of other sources, even at a high degree of disaggregation at the regional or the industry level. In particular, the correlation between firm´s responses to the year-on-year variation in employment and the same rate provided by Social Security Registers is 0.6 at the province level and 0.7 at the 2-digit industry level.

Figure 10 shows the number of responses by day. Panel A shows the responses by natural day, and marks with a vertical red line the announcement of the Pfizer vaccine. The 7th, 8th, 14th and 15th were weekends, and hence the number of responses these

Figure 9: Employment growth of final sample compared to other sources

Panel A: Employment growth by sector
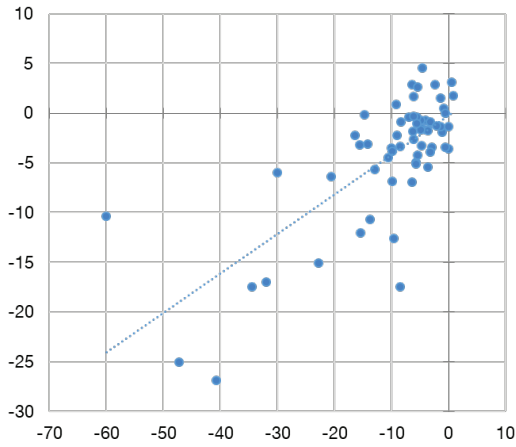
Panel B: Employment growth by province
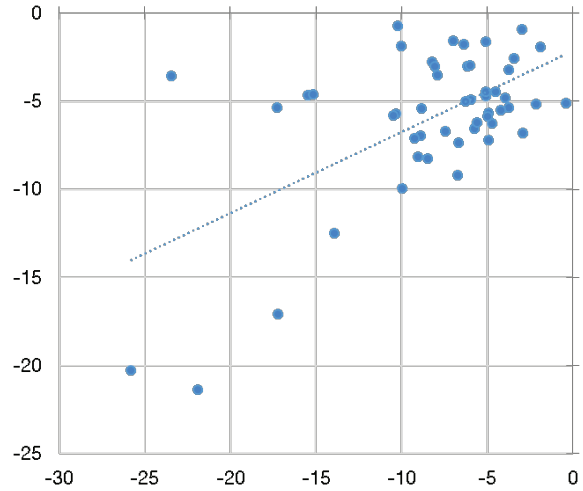
Source: Ministry of Social Security and Banco de España

Notes: Panel A shows a scatterplot with 2-digit sector employment growth using the survey (x-axis), and social security data (y-axis). Panel B shows a scatterplot with employment growth by province using the survey (x-axis), and social security data (y-axis).

days are very low. Panel B shows the number of responses by day, but not taking into account these weekends, and assigning the very few responses on the weekend to that Friday. Note in this figure we call 1 the first workday of the survey, 2 the second, and so on. The announcement of the Pfizer vaccine was made on the 3rd weekday of the survey.

Figure 10: Number of responses by day

Panel A: Responses by natural day
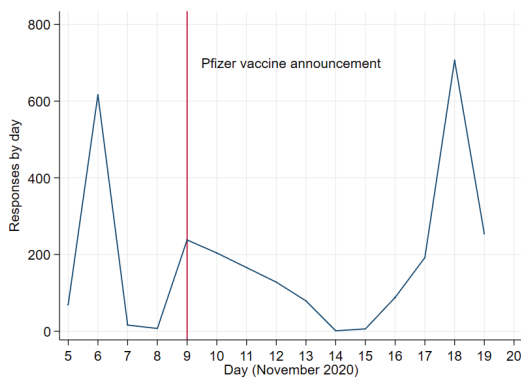
Panel B: Responses by working day
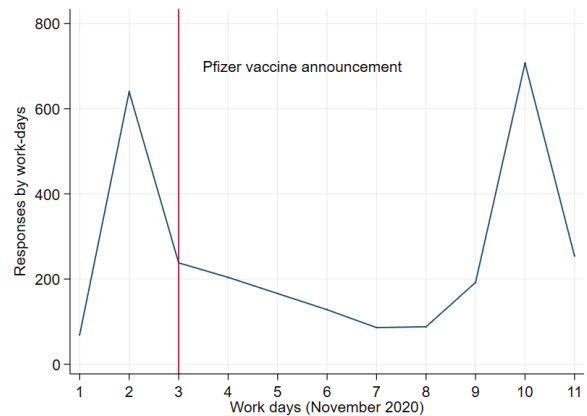
Source: EBAE

Notes: Panel A shows the number of responses received by day. Panel B shows the number of responses received by each working day, assigning the very few responses during the weekend to the previous Friday. Vertical red line signals the announcement of the Pfizer vaccine on the 9th November.

A.2. Questionnaire

This appendix presents the questionnaire of the survey translated to English. The original questionnaire (in Spanish) can be found here.

Recent evolution and perspectives					
1. Business turnover	Significant decrease	Decrease	Unchanged	Increase	Significant increase
How is your firm's turnover changing in 4Q20 compared to 3Q20?					
How do you expect your firm's turnover to change in 1Q20 compared to 4Q20?					
2. Employment	Significant decrease	Decrease	Unchanged	Increase	Significant increase
How is your firm's turnover changing in 4Q20 compared to 3Q20?					
How do you expect your firm's employment to change over 1Q20 compared to 4Q20?					
3. Input prices	Significant decrease	Decrease	Unchanged	Increase	Significant increase
How is your firm's main input prices changing in 4Q20 compared to 3Q20?					
How do you expect your firm's main input prices to change over 1Q20 compared to 4Q20?					
4. Output prices	Significant decrease	Decrease	Unchanged	Increase	Significant increase
How is your firm's output prices changing in 4Q20 compared to 3Q20?					
How do you expect your firm's output prices to change over 1Q20 compared to 4Q20?					

5. Factors conditioning firm's activity	How have the following factors affected your firm's activity?				
	Very negative	Negative	Neutral	Positive	Very positive
Demand for its products and services					
Access to external financing					
Receivables to customers					
Regular supplier issues					
Availability of workforce					
Pressure from competition					
Uncertainty about the COVID-19 pandemic					
Economic policy uncertainty					

Impact of COVID-19

6. Activity compared to pre-crisis levels	Where is your firm's turnover and employment in the 4Q20 compared to the same period last year?									
	YoY decline						Unchanged	YoY increase		
	>50%	30-50%	15-30%	10-15%	5-10%	0-5%	0%	0-5%	5-10%	>10%
Turnover										
Employment										

7. Take-up of support measures	Please indicate the extent to which you are currently using the following measures to cushion the impact of COVID-19 on your business			
	Not at all	Somewhat relevant	Relevant	Very relevant
Work from home				
Greater use of online selling channels				
ERTE (short-term work support program)				
Layoffs or non-renewal of temporary contracts				
Wage adjustments				
Reduction of investment plans				
ICO (Public-guaranteed loans schemes)				
Other loans (non-ICO)				
Tax deferral				
Renegotiation or deferral of rental contracts				

8. End of the crisis	already is	2020	2021	2022	later than 2022	too uncertain
When will your firm's activity return to pre-crisis levels?						

B. Robustness

Table 8: Summary statistics by sector for sample used in regressions.

PANEL A

Averages	Δ Turnover	Δ Emp	log TFP	Age	Rural	Temp. Workers	Intangible capital	Debt Ratio	Size (Emp)	Cash ratio
Manufacturing	-12.80	-5.49	1.28	29.25	0.44	0.12	0.07	0.31	136.40	0.12
Construction	-13.06	-6.02	1.20	23.15	0.26	0.30	0.05	0.27	55.21	0.16
Trade	-15.51	-7.73	0.84	26.87	0.27	0.13	0.07	0.31	70.20	0.13
Transport	-16.31	-8.15	1.98	24.73	0.29	0.20	0.08	0.36	134.71	0.14
Hospitality	-47.93	-37.78	0.94	21.52	0.28	0.29	0.05	0.37	45.54	0.16
IT services	-9.21	-3.83	1.56	19.46	0.08	0.15	0.35	0.22	100.69	0.22
Real estate	-12.78	-4.72	1.11	26.58	0.12	0.04	0.02	0.21	10.57	0.12
Prof. services	-11.43	-5.74	1.73	19.65	0.13	0.12	0.14	0.24	50.55	0.25
Admin. services	-17.00	-13.47	1.79	18.53	0.15	0.20	0.15	0.35	122.30	0.19
Other services	-34.17	-19.32	1.36	20.51	0.15	0.24	0.11	0.29	67.06	0.22
Total	-16.86	-9.34	1.25	24.98	0.28	0.17	0.09	0.30	86.43	0.15
Obs	2,715	2,715	2,715	2,715	2,715	2,715	2,715	2,715	2,715	2,715

PANEL B

IQRs	Δ Turnover	Δ Emp	log TFP	Age	Rural	Temp. Workers	Intangible capital	Debt Ratio	Size (Emp)	Cash ratio
Manufacturing	22.50	7.50	0.19	17.00	1.00	0.16	0.03	0.44	63.00	0.15
Construction	22.50	7.50	0.33	16.00	1.00	0.47	0.01	0.44	34.59	0.20
Trade	22.50	7.50	0.17	17.00	1.00	0.18	0.03	0.53	36.25	0.17
Transport	22.50	7.50	0.35	15.00	1.00	0.29	0.01	0.53	47.88	0.16
Hospitality	20.00	47.50	0.23	18.00	1.00	0.29	0.01	0.58	35.09	0.19
IT services	12.50	2.50	0.46	12.00	0.00	0.20	0.76	0.41	72.12	0.33
Real estate	22.50	0.00	0.61	16.00	0.00	0.00	0.00	0.33	5.00	0.15
Prof. services	22.50	2.50	0.34	12.00	0.00	0.15	0.13	0.41	29.70	0.34
Admin. services	40.00	22.50	0.55	16.00	0.00	0.31	0.07	0.64	56.50	0.27
Other services	52.50	40.00	0.50	13.00	0.00	0.31	0.03	0.60	50.75	0.27
Total	22.50	12.50	0.63	17.00	1.00	0.24	0.03	0.51	43.00	0.20
Obs	2,715	2,715	2,715	2,715	2,715	2,715	2,715	2,715	2,715	2,715

Source: EBAE survey and Central de Balances Integrada.
Notes: This table keeps only the 2,715 observations that are later used in the regression analysis, which are the observations for which we have data on all the variables of interest. Panel A shows the averages and Panel B the interquantile ranges (measured as p75-p25 within the industry). The first column of both tables corresponds to yearly change in turnover, and the second column to the yearly change in employment. Column 3, 4 and 5 correspond to log TFP, age of the firm, and the dummy variable indicating the headquarters are in rural areas. Column 6 shows the share of temporary workers. Column 7, 8 and 10 show the share of intangible capital (intangible capital over total capital), the debt ratio (total debt over total assets), and the cash ratio (cash over total assets) respectively. Column 9 shows size, measured by the number of employees.

Table 9: Summary statistics weighted

PANEL A

Averages	Δ Turnover	Δ Emp	log TFP	Age	Rural	Temp. Workers	Intangible capital	Debt Ratio	Size (Emp)	Cash ratio
Manufacturing	-18.93	-10.29	1.29	25.36	0.50	0.12	0.03	0.29	25.50	0.15
Construction	-15.33	-6.33	1.22	21.97	0.25	0.24	0.04	0.25	12.19	0.18
Trade	-17.10	-8.90	0.85	21.19	0.32	0.10	0.05	0.31	10.99	0.15
Transport	-14.62	-5.56	1.99	20.04	0.29	0.17	0.08	0.27	17.89	0.17
Hospitality	-43.82	-34.27	0.91	18.51	0.38	0.29	0.05	0.36	10.29	0.18
IT services	-12.41	-4.44	1.65	18.08	0.14	0.20	0.24	0.18	30.49	0.23
Real estate	-13.21	-4.02	1.10	25.67	0.14	0.03	0.01	0.21	3.69	0.12
Prof. services	-11.30	-5.06	1.75	18.43	0.17	0.12	0.08	0.19	10.78	0.30
Admin. services	-20.00	-15.47	1.84	18.37	0.18	0.14	0.09	0.30	40.30	0.20
Other services	-34.00	-19.03	1.47	18.63	0.14	0.23	0.15	0.26	9.18	0.24
Total	-22.49	-13.57	1.20	20.71	0.30	0.16	0.06	0.29	14.13	0.18
Obs	3,523	3,457	3,161	3,584	3,584	3,160	3,584	3,584	3,584	3,582

PANEL B

IQRs	Δ Turnover	Δ Emp	log TFP	Age	Rural	Temp. Workers	Intangible capital	Debt Ratio	Size (Emp)	Cash ratio
Manufacturing	37.50	12.50	0.29	16.00	1.00	0.17	0.01	0.47	16.31	0.20
Construction	22.50	2.50	0.39	15.00	1.00	0.46	0.00	0.43	9.00	0.23
Trade	40.00	7.50	0.19	18.00	1.00	0.15	0.01	0.58	6.00	0.19
Transport	22.50	2.50	0.44	16.00	1.00	0.26	0.01	0.49	7.00	0.21
Hospitality	20.00	52.50	0.22	15.00	1.00	0.42	0.01	0.67	5.91	0.18
IT services	22.50	2.50	0.56	16.00	0.00	0.20	0.50	0.39	20.58	0.33
Real estate	22.50	0.00	0.65	15.00	0.00	0.00	0.00	0.32	2.00	0.15
Prof. services	22.50	0.00	0.34	14.00	0.00	0.12	0.03	0.31	4.88	0.39
Admin. services	40.00	40.00	0.50	17.00	0.00	0.22	0.01	0.57	16.04	0.27
Other services	52.50	40.00	0.41	18.00	0.00	0.32	0.03	0.37	6.14	0.29
Total	40.00	22.50	0.68	17.00	1.00	0.24	0.01	0.52	6.70	0.24
Obs	3,523	3,457	3,161	3,584	3,584	3,160	3,584	3,584	3,584	3,582

Source: EBAE survey and Central de Balances Integrada.

Notes: This table keeps only the 2,715 observations that are later used in the regression analysis, which are the observations for which we have data on all the variables of interest. We use 60 size-sector grids to compute elevation weights that match the distributional data from the Social Security dataset. Panel A shows the averages and Panel B the interquantile ranges (measured as p75-p25 within the industry. The first column of both tables corresponds to yearly change in turnover, and the second column to the yearly change in employment. Column 3, 4 and 5 correspond to log TFP, age of the firm, and the dummy variable indicating the headquarters are in rural areas. Column 6 shows the share of temporary workers. Column 7, 8 and 10 show the share of intangible capital (intangible capital over total capital), the debt ratio (total debt over total assets), and the cash ratio (cash over total assets) respectively. Column 9 shows size, measured by the number of employees.

Table 10: Impact of the COVID-19 shocks on firms.

VARIABLES	(1) Sales	(2) Sales	(3) Emp.	(4) Emp.
TFP	4.74***	1.58	2.04**	1.04
	(1.20)	(1.17)	(1.01)	(0.86)
Age	0.08**	0.04	0.04	0.03
	(0.03)	(0.03)	(0.03)	(0.02)
Rural	3.29***	2.56***	1.52	1.21
	(1.08)	(0.90)	(0.93)	(0.79)
Temporary workers	-8.93***	1.57	-7.87***	-5.44***
	(2.74)	(1.83)	(1.88)	(1.64)
Intangible share	0.09	-1.81	1.82	1.30
	(1.95)	(1.72)	(1.60)	(1.54)
Debt ratio	-2.00	0.85	0.45	1.02
	(1.72)	(1.39)	(1.32)	(1.21)
Cash ratio	-3.48	-2.29	3.30*	3.02*
	(2.92)	(2.40)	(1.84)	(1.71)
10-50 emp.	1.09	1.57*	0.06	0.66
	(1.08)	(0.90)	(0.94)	(0.80)
50-250 emp.	6.42***	4.25***	2.73**	2.79***
	(1.49)	(1.14)	(1.10)	(0.94)
+250 emp.	6.77***	6.95***	5.21***	4.49***
	(2.33)	(2.26)	(1.52)	(1.44)
WFH		2.55***		1.35**
		(0.78)		(0.57)
Online		2.10***		1.58**
		(0.79)		(0.78)
Firing		-6.38***		-8.28***
		(1.14)		(1.15)
Investment		-6.49***		-2.89***
		(0.80)		(0.65)
Rentals		-4.09***		-3.52***
		(1.10)		(0.91)
ERTEs		-10.85***		-10.18***
		(0.96)		(0.92)
ICOs		-0.51		0.16
		(0.89)		(0.73)
Tax deferrals		-1.31		0.38
		(1.02)		(0.86)
Observations	2,715	2,715	2,715	2,715
R^2	0.04	0.49	0.39	0.51
Response controls	NO	YES	NO	YES
SectXreg FE	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, **p<0.05, * p<0.1

Source: EBAE survey and Central de Balances.
Notes: Outcomes of regression (1) using as dependent variable the reported year-on-year change in turnover (columns 1-2) and the reported year-on-year change in employment (columns 3-4) from

Table 11: Impact of the COVID-19 shocks on firms - Further mechanisms.

	(1) Sales	(2) Sales	(3) Sales	(4) Emp.	(5) Emp.	(6) Emp.
Average annual sales growth 2017-2019		0.02			0.00	
		(0.02)			(0.02)	
TFP	2.90**	1.98	2.89**	2.04**	1.78*	1.97**
	(1.23)	(1.21)	(1.23)	(1.01)	(1.01)	(0.99)
Age	0.05*	0.06*	0.05*	0.04	0.04	0.04
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Rural	2.71***	2.49**	2.70***	1.52	1.22	1.49
	(0.97)	(0.98)	(0.97)	(0.93)	(0.93)	(0.92)
Temporary workers	-1.00	-1.57	-0.99	-7.87***	-7.97***	-7.83***
	(2.16)	(2.20)	(2.16)	(1.88)	(1.87)	(1.87)
Intangible share	-1.34	-1.82	-1.36	1.82	1.91	1.73
	(1.83)	(1.93)	(1.83)	(1.60)	(1.66)	(1.60)
Debt ratio	-0.26	-0.52	-0.25	0.45	0.06	0.50
	(1.53)	(1.57)	(1.53)	(1.32)	(1.34)	(1.33)
Cash ratio	-1.22	-0.40	-1.08	3.30*	3.85**	4.13**
	(2.55)	(2.44)	(2.53)	(1.84)	(1.83)	(1.83)
10-50 emp.	1.16	1.51	1.21	0.06	0.09	0.41
	(1.04)	(1.06)	(1.05)	(0.94)	(0.98)	(0.94)
50-250 emp.	4.96***	5.19***	5.01***	2.73**	2.75**	3.04***
	(1.38)	(1.37)	(1.39)	(1.10)	(1.10)	(1.09)
+250 emp.	8.53***	8.77***	8.56***	5.21***	5.28***	5.39***
	(2.28)	(2.29)	(2.29)	(1.52)	(1.55)	(1.50)
Capital intensity			0.01			0.07***
			(0.03)			(0.02)
Observations	2,715	2,641	2,715	2,715	2,641	2,715
R-squared	0.37	0.38	0.37	0.39	0.39	0.39
Sector FE	NO	NO	NO	NO	NO	NO
Region FE	NO	NO	NO	NO	NO	NO
SectXreg FE	YES	YES	YES	YES	YES	YES

Source: EBAE survey and Central de Balances.
Notes: Outcomes of regression (1) using as dependent variable the reported year-on-year change in turnover (columns 1-3) and the reported year-on-year change in employment (columns 4-6) from question 6. Columns (1) and (4) are analogous to column (4) and (8) of Table 2, respectively. All regressions include a full set of sector-region fixed effects.

Table 12: Impact of the COVID-19 shocks on firms - Firm absorption of the shock.

	(1) Firm Absorption
TFP	0.64**
	(0.29)
Age	-0.02
	(0.02)
Rural	-0.11
	(0.28)
Temporary workers	0.04
	(0.49)
Intangible share	-1.33
	(1.88)
Debt ratio	0.20
	(0.63)
Cash ratio	-0.70
	(0.69)
10-50 emp.	-0.52
	(0.44)
50-250 emp.	-0.15
	(0.38)
+250 emp.	-0.26
	(0.60)
Observations	2,673
R-squared	0.09
Sector FE	NO
Region FE	NO
SectXreg FE	YES

Source: EBAE survey and Central de Balances.
Notes: Outcomes of regression (1) using as dependent variable the firm absorption capacity, computed as follows. First, we regress the employment change on turnover change, and second we compute the absorption capacity as the inverse of the residual from that regression, which could be interpreted as a measure of the ability of firms to cushion the turnover shock. Regressions includes a full set of sector-region fixed effects.

Table 13: Impact of the COVID-19 shocks on firm employment - Non-linearities.

	(1) Emp.	(2) Emp.
ΔTurnover		0.30***
		(0.04)
$(\Delta\text{Turnover})^2$		-0.004***
		(0.000)
TFP	2.04**	0.49
	(1.01)	(0.83)
Age	0.04	0.00
	(0.03)	(0.02)
Rural	1.52	0.19
	(0.93)	(0.67)
Temporary workers	-7.87***	-6.63***
	(1.88)	(1.37)
Intangible share	1.82	2.50*
	(1.60)	(1.30)
Debt ratio	0.45	0.64
	(1.32)	(1.05)
Cash ratio	3.30*	4.09***
	(1.84)	(1.54)
10-50 emp.	0.06	-0.65
	(0.94)	(0.77)
50-250 emp.	2.73**	0.30
	(1.10)	(0.84)
+250 emp.	5.21***	0.99
	(1.52)	(1.40)
Observations	2,715	2,715
R-squared	0.39	0.63
Sector FE	NO	NO
Region FE	NO	NO
SectXreg FE	YES	YES

Source: EBAE survey and Central de Balances.
Notes: Outcomes of regression (1) using as dependent variable the reported year-on-year change in employment from question 6. Columns (1) is analogous to column (8) of Table 2. Column (2) adds the year-on-year change in employment from question 6 and its square. All regressions include a full set of sector-region fixed effects.

Table 14: Responses of firms to COVID-19 shock.

	(1) WfH	(2) e-COMM	(3) Invest.	(4) Firing	(5) ERTEs	(6) ICOs	(7) Taxes	(8) Rentals
TFP	-0.00	-0.06**	-0.04	-0.00	-0.03	-0.07**	-0.02	-0.06**
	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)	(0.04)	(0.03)	(0.03)
Age	-0.00***	-0.00**	-0.00	0.00	-0.00	-0.00***	-0.00**	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Rural	-0.06***	-0.02	0.08***	0.02	-0.03	-0.02	-0.02	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
Temporary workers	-0.22***	-0.07*	-0.06	0.17***	0.04	0.16***	0.08*	0.09**
	(0.05)	(0.04)	(0.05)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)
Intangible share	0.17***	0.06	0.04	-0.04	-0.03	0.03	0.00	0.02
	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)	(0.05)	(0.04)	(0.03)
Debt ratio	-0.05	0.00	0.04	0.01	0.04	0.32***	0.06*	0.00
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.04)
Cash ratio	-0.07	0.04	-0.05	-0.00	-0.07	-0.39***	-0.26***	0.06
	(0.05)	(0.05)	(0.06)	(0.05)	(0.05)	(0.06)	(0.05)	(0.05)
10-50 emp.	0.04*	0.00	-0.01	0.02	0.08***	0.05**	-0.05*	-0.05**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)
50-250 emp.	0.19***	0.04	-0.02	0.03	0.10***	-0.01	-0.15***	-0.05*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)
+250 emp.	0.30***	-0.01	0.07	0.00	0.10**	-0.27***	-0.19***	-0.09**
	(0.04)	(0.05)	(0.05)	(0.04)	(0.05)	(0.05)	(0.04)	(0.04)
Δ Turnover	0.00*	-0.00	-0.01***	-0.01***	-0.01***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	2,715	2,715	2,715	2,715	2,715	2,715	2,715	2,715
R^2	0.33	0.19	0.22	0.26	0.35	0.28	0.26	0.25
SectXreg FE	YES	YES	YES	YES	YES	YES	YES	YES

Source: EBAE survey and Central de Balances.

Notes: Outcomes of regression (1) using as dependent variable a dummy that takes the value 1 if the firm perceives as very relevant or relevant working from home schemes (WfH - column 1), e-commerce (e-COMM - column 2), reduction in investment (Invest - column 5), firing of workers (Firing - column 4), furlough schemes (ERTEs - column 5), state-guaranteed credit (ICOs - column 6), tax deferrals (Tax def. - column 7), and renegotiation of rental contracts (Rentals - column 8). The regressions here are analogous to Table 3 and 4, with the sole difference that we are further controlling for the size of the shock, proxied by the change in turnover.The regression includes a full set of sector-region fixed effects.

Table 15: The impact of the COVID-19 vaccine on firms' recovery expectations.

	(1) Recovery 2021	(2) Recovery 2021	(3) Recovery 2021	(4) Recovery timing
vaccine	0.066***	0.074*	0.083**	-0.266***
	(0.022)	(0.042)	(0.035)	(0.090)
Δ turnover	0.005***	0.005***	0.004***	-0.039***
	(0.001)	(0.001)	(0.001)	(0.002)
TFP	0.020	0.020	0.013	-0.163
	(0.039)	(0.039)	(0.060)	(0.111)
Age	-0.002***	-0.002***	-0.002	0.002
	(0.001)	(0.001)	(0.001)	(0.003)
Temporary workers	0.020	0.020	0.003	-0.204
	(0.068)	(0.068)	(0.105)	(0.206)
Intangible share	0.028	0.029	0.109	0.204
	(0.063)	(0.063)	(0.108)	(0.161)
Debt ratio	0.010	0.010	-0.013	-0.207
	(0.044)	(0.044)	(0.067)	(0.137)
Cash ratio	-0.048	-0.048	-0.000	-0.676**
	(0.072)	(0.072)	(0.105)	(0.268)
10-50 emp.	0.028	0.027	-0.011	0.122
	(0.026)	(0.026)	(0.045)	(0.112)
50-250 emp.	0.034	0.034	0.039	0.024
	(0.030)	(0.031)	(0.054)	(0.137)
+250 emp.	0.091*	0.091*	0.091	0.447**
	(0.055)	(0.055)	(0.094)	(0.184)
Time trend		-0.001		
		(0.005)		
Observations	1,565	1,565	617	944
R^2	0.263	0.263	0.276	0.482
Controls	YES	YES	YES	YES
SectXreg FE	YES	YES	YES	YES
Time trend	NO	YES	NO	NO

Source: EBAE survey and Central de Balances.

Notes: Outcomes of regression (2) using as dependent variable a dummy taking value 1 when the firm reports a full recovery by the end of 2021 (columns 1, 2 and 3); an ordinal variable that captures the timing of the recovery, taking values 1, 2, 3, 4 and 5 if the firm expects recovery "already", in 2020, 2021, 2022 and later than 2022, respectively (column 4). The variable *vaccine* takes the value 1 if the firm replied after the vaccine announcement on November 9th 2020, and 0 otherwise. The regression includes a full set of sector-region, controls for the size of the shock, proxied by the year-on-year change in turnover, and for all the observables we have been using in the previous sections: size, age, TFP, rural status, temporary workers, intangible share, debt and cash ratio. Column 2 also includes a linear time trend. Region-sector clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

C. Heterogeneity in factors affecting firms' activity as a result of the COVID-19 shock

Table 16: Factors affecting firms' activity as a result of the Covid-19 shock

VARIABLES	(1) Demand	(2) Financing	(3) Unpaid rec.	(4) Supply	(5) Workers	(6) Competition
TFP	-0.03	-0.02	0.02	-0.05***	-0.02	-0.05*
	(0.03)	(0.02)	(0.03)	(0.02)	(0.02)	(0.03)
Age	0.00	-0.00	-0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Rural	-0.09***	-0.02	0.01	-0.00	0.02	-0.03
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Temporary workers	0.01	0.03	0.06	-0.03	0.07*	0.05
	(0.05)	(0.04)	(0.06)	(0.03)	(0.04)	(0.05)
Intangible share	0.00	-0.03	0.07	0.03	-0.04	0.02
	(0.05)	(0.04)	(0.06)	(0.04)	(0.03)	(0.06)
Debt ratio	-0.01	0.07**	-0.05	0.00	-0.02	-0.06*
	(0.04)	(0.03)	(0.04)	(0.03)	(0.03)	(0.04)
Cash ratio	0.05	0.03	-0.13**	0.10**	0.04	-0.05
	(0.07)	(0.05)	(0.06)	(0.04)	(0.04)	(0.07)
10-50 emp.	-0.02	-0.04*	0.03	-0.02	-0.00	-0.03
	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
50-250 emp.	-0.04	-0.09***	0.04	-0.05**	-0.01	-0.07**
	(0.04)	(0.02)	(0.03)	(0.02)	(0.02)	(0.03)
+250 emp.	-0.11*	-0.14***	0.00	-0.11***	-0.02	-0.14***
	(0.06)	(0.04)	(0.05)	(0.03)	(0.03)	(0.05)
Observations	2,715	2,715	2,715	2,715	2,715	2,715
R^2	0.20	0.20	0.14	0.15	0.15	0.16
SectXreg FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: EBAE survey and Central de Balances.

Notes: Outcomes of regression (1) using as dependent variable a dummy that takes the value 1 if the factor affected firms' activity negatively or very negatively, where these factors are: demand disruptions (column 1), problems accessing financing (column 2), unpaid receivables (column 3), supply disruptions (column 4), availability of workers (c), and competition pressures (column 6). The regression includes a full set of sector-region fixed effects.

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