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THE IMPACT OF COVID-19 ON ITALIAN FIRMS'PROFITABILITY: A PANEL EVENT STUDY

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Abstract. *Using data from the AIDA dataset carried out by Bureau van Dijk, we empirically analyze the effect of COVID-19 pandemic on the financial performance of enterprises, specifically focusing on their operational efficiency and capacity to generate profits. The panel structure of the dataset enables us to execute a panel event study, thereby furnishing empirical insights into the significant repercussions of the COVID-19 outbreak on the profitability of Italian companies. The findings demonstrate a noteworthy and enduring influence of the pandemic on businesses, albeit with varying degrees of severity contingent upon the industrial sector and geographic location of the firms. The heterogeneous results are indicative of the diverse lockdown measures on economic activities and the substantial regional economic disparities prevalent within our country.*

Keywords: *Profitability, ROI, ROE, COVID-19 pandemic, panel event study*

1. INTRODUCTION

In 2020, Italy was the first European country to be affected by COVID-19, with very high rates of contagion and death, and the Italian government was the first of Western governments to implement measures progressively stricter in terms of duration and severity, such as lockdowns, curfews, and limitations on face-to-face interactions, to reduce infection and hospitalization rates. Therefore, beyond the impact on public health, the COVID-19 pandemic has had profound economic impacts on people's livelihoods, but also on enterprises, which faced several economic hardships because of diminished demand, disruptions in supply chains, and production slowdowns associated with unsafe work environments. The health regulations, forcing the social distancing between people and the complete or partial closure of many activities in presence and direct contact with

customers, have hampered company sales, generating dramatic problems of liquidity and profitability.

Several studies have attempted to investigate the immediate impact of the COVID-19 outbreak on financial outcomes and/or stock markets (Liu et al., 2020; Nicola et al., 2020; Zhang et al., 2020). However, the main limitation of this existing literature is the restricted dataset and the fact that the COVID-19 pandemic was still ongoing at the time of the research, thus not considering subsequent effects. Therefore, given the impossibility of assessing and drawing definitive conclusions about the impact of the health crisis on corporate financial performance, the results of these studies can be considered preliminary.

The main goal of this paper is therefore twofold: first, to assess the intensity of effects of the pandemic outbreak on business profitability. We wish to contribute to the existing literature by offering a more comprehensive assessment of the effect of COVID-19 on the economic activities in Italy, providing an analysis that is based on panel data spanning from 2013 to 2021 encompassing about 150,000 Italian's firms. Second, we show that these effects tend to be uneven across sectors and regions. Since the outbreak tends to be more impactful in sectors where companies classified as non-essential, which had to be shut down when remote work was not possible, for which stronger effects are plausibly expected. In addition, the evident territorial differences that the virus presented in its expansion and spread and the notable duality of the Italian economic landscape, explains the heterogeneous results across regions.

Moreover, our study adds to the literature that use the event study methodology to evaluate the impact of a non-corporate event such as the outbreak of the disease on financial metrics and/or stock markets (Chen et al., 2007, 2018; Heyden and Heyden, 2021; Liu et al., 2020; Pendell and Cho, 2013). Indeed, we empirically test the different and scarring effect of the outbreak of the pandemic on the profitability of the Italians' firms, implementing a quasi-experimental method, i.e. the panel event study. This design is an effective empirical tool to identify the impact of pandemic on financial outcomes, while taking into account pre-event trends and confounding factors that may affect this relationship. We identify pre- and post- COVID-19 periods, and we use two different profitability outcomes the Return on Investment (henceforth ROI) and the Return on Equity (henceforth ROE), adopting the specifications of dynamic fixed effects models. Estimates are carried out separately for sectors and geographical location of the operational headquarters, due to differences in the stringency of the anti-

ontagion policies adopted by the government depending on the severity of the irus spread.

The rest of the paper is organized as follows. Section 2 contains a review of he existing literature on the impact of the COVID-19 pandemic on the rofitability of firms; Section 3 describes the data used; the empirical strategy, vith a brief illustration of the panel event study methodology are described in ection 4; while Section 5 summarizes the results, and Section 6 concludes.

2. LITERATURE REVIEW

The pandemic's rapid spread had a profound impact on economies and financial narkets on a global scale, affecting practically every business sector and ndustry.

Several studies have explored the influence of COVID-19 at the macro level, articularly on national stock markets' performance and found an adverse, strong elationship. Baker et al. (2020) suggest that no previous infectious disease utbreak, including the Spanish flu, has affected the U.S. stock market as orcefully as the COVID-19 pandemic. However, the global pandemic of OVID-19 has generated negative shocks on the equity markets across the globe. Harjoto et al. (2021), using an event study method, reveal that the adverse impact f COVID-19 on the equity markets is greater for emerging countries than leveloped countries.

Meanwhile, a growing number of studies take a closer, micro-level examination of the variations in the profitability of firms under the COVID-19 risis context, revealing that the severity of the shock due to the pandemic uffered by firms is closely correlated by their size and the sector in which they perate. According to Baldwin and Weder di Mauro (2020), Yan (2020), small irms experienced greater negative shocks from COVID-19 relative to large irms, due to their lower competitive power, worse access to capital, experience nd operational efficiency. On the other hand, firms operating in different sectors howed different responses to the COVID-19 shock, as documented by Bartik et l. (2020), Shen et al. (2020), Fahlenbrach et al. (2021) and Golubeva (2021). Particularly, companies facing financial constraints within the manufacturing, etail industries and services domains have experienced more severe epercussions from the outbreak and face an elevated risk of operational closure. Nayak et al. (2022) present a detailed explanation of the impact of COVID-19

on six different industries, and they conclude that not only the major areas such as global supply chains, trade, agriculture industry, transportation and tourism industry, and so on, have been severely disrupted because of the outbreak of the pandemic, but also the economy of various other sectors such as aviation industry, entertainment industry, sports industry, have been severely hampered all over the world due to lockdown.

However, these papers offer initial findings as they have carried out an examination during the initial stages of the pandemic, not considering the more intricate effects the COVID-19 outbreak had on companies in later periods. Therefore, we contribute to this literature providing a more detailed investigation on the impact of the outbreak on the profitability of firms, using an effective empirical tool that considers any pre-event trends and confounding factors that might influence this relationship, namely the panel event study method.

3. DATA

In order to conduct our study, we use data from the AIDA dataset carried out by Bureau van Dijk, which contain balance sheet/income statement information on Italian firms, providing objective information given that balance sheet and income statement are compulsory, and they are compiled according to transparent and standardized criteria by all firms (except banking, insurance sector and the public sector entities).

The dataset spans the period 2013-2021 of a balanced sample at the firm level, i.e., we only use firms with data for all sample periods.

In addition, we restrict our focus to small-medium firms (less than 100 employees), as large firms are able to mitigate the negative shock of the pandemic outbreak due to their greater competitive power than small firms due to larger market share, better access to capital, experience, and operational efficiency (Ichev and Marinc, 2018).

Tables 1 and 2 in the Appendix provide some descriptive statistics.

4. METHODOLOGY: PANEL EVENT STUDY

In this study, the empirical work is based on the panel event study methodology, as we seek to reveal how Italian firms, particularly their profitability, behave during and after the outbreak of the coronavirus. The design estimates the impact

of some events that occur by considering the variation in outcomes around the adoption of the event compared with a baseline reference period, one can estimate both event leads and lags, which allows us to have a clear visual representation of the event's causal impact (Clarke et al., 2021).

The key assumption underlying consistent estimation in panel event study model is that the occurrence of the event is not systematically related to the changes in levels that would have occurred in the future in the absence of the event. In particular, this methodology has been borne out of older difference-in-differences (DD) designs, or two-way fixed-effects models, to overcome their limits, such as the parallel trend assumption. Therefore, it can be used, also in cases where events occur at the same time in each unit.

We identify pre- and post- COVID-19 periods, which coincide with the year 2020. Subsequently, we estimate a dynamic model of the form:

$$y_{it} = \alpha + \sum_{j=2}^{J} \beta_j Lag_{it}^{j} + \sum_{k=1}^{K} \gamma_k Lead_{it}^{k} + \lambda_i + \mu_t + \varepsilon_{it} \quad . \quad (1)$$

Where the y_{it} is the profitability outcome of firm *i* at the time *t*. We use two different profitability outcomes: i) the Return on Invested (ROI), which is a metric that may be used to assess a company's profitability as well as reveal the origins of its competitive advantages; ii) the Return on Equity (ROE), which is a financial metric that reveals the ability of a company to convert its equity financing into profits. When contrasted to ROI, it represents the total return on all capital invested in an asset, whereas ROE solely evaluates the equity component (Damodaran, 2007).

Lag_{it}^{j} and $Lead_{it}^{k}$ are the *j-lag* and *k-lead* set of dummies denoting the time distance away from the event – the outbreak of COVID-19 - λ_i the firms fixed effect, μ_t the time fixed effect.

The terms β_j and γ_k are parameters to be estimated denoting how financial measures vary in periods before and after the COVID-19 outbreak (compared to the year prior to the event, in this case the year of 2019).

In general, when policies are assigned by a group, such as a state, and outcomes are followed over time within these groups, a standard inference

problem arises, related to the potential serial correlation of the outcome variable over time. However, the standard solution is to allow for within-cluster autocorrelation by using a cluster-robust variance-covariance estimator (CRVE) to estimate standard errors and CIs on regression parameters (Wooldridge, 2010). Therefore, to overcome this problem, we adopt a dynamic fixed effects model specifications with standard errors clustered at the firm level.

5. RESULTS

To analyze the impact of the COVID-19 pandemic on the profitability of Italian companies, we estimate Eq. (1) separately for ROI and ROE. In addition, considering that some companies were closed for several months due to government decisions (e.g., the March 22, 2020 DPCM), while others were able to continue operating during the pandemic, albeit not as usual, but with rather limited restrictions related to mitigating the spread of the virus, we make separate estimates by industry sectors. Furthermore, we estimate the impact of the pandemic by also distinguishing companies by geographic area (north, central, and south), so as to consider the different economic starting conditions that companies face in relation to the location of the company, but also to the different level of spread of the COVID-19 virus regionally. [1]

Considering that, the leads and as the fixed effects included in the model allow us to control for any linear and non-linear trends of unobservable that may affect profitability in a given year. It is important to note that in the estimates reported below, in which all possible leads are included, some significant differences are observed in the pre-COVID 19 period, but these are sufficiently far removed from the pandemic period, so these significant differences are probably due to changes in the composition of variables and not to temporal trends.

[1] All event-study results were conducted using the Stata program *eventdd* by Clarke and Schythe, (2023).

In Tables 3a and 3b and Tables 4a and 4b, we report estimates on the impact of the pandemic on the accommodation and catering services sector and the rental, travel agencies, business support services, respectively, that are nested in the hospitality industry. Our findings suggest that, in the context of the hospitality industry, activities of accommodation and catering services sector were the most affected by the outbreak of pandemic. In fact, the ROI of Italians firms operating in this sector (column 1 of Table 3a), compared to the baseline year -i.e., 2019 the period immediately prior to the occurrence of the pandemic- declines by about 6.8 pp at the timing of the pandemic outbreak, and deteriorates further in the following year by about 1.8 pp. Table 3b, column 1, shows the impact of COVID-19 on profitability measured by the ROE; the results suggest a decrease of about 11 pp in 2020, but an increase in the following year, which could be due to an increase in the level of debt due to emergency loans, resulting in higher borrowing costs and consequently higher ROE.

Table 3a: The impact of COVID-19 on the ROI of firms operating in the accommodation and catering services sector

Time relative to COVID-19 event	ROI		ROI North		ROI Centre		ROI South	
t-7	-2.318	***	-2.433	***	-1.889	***	-2.629	***
	(0.184)		(0.276)		(0.355)		(0.323)	
t-6	-1.361	*	-1.060	*	-1.244	*	-1.968	**
	(0.177)		(0.266)		(0.342)		(0.312)	
t-5	-0.493	*	0.144		-0.962	**	-1.007	*
	(0.171)		(0.259)		(0.326)		(0.306)	
t-4	-0.138	*	0.275		-0.554	*	-0.341	
	(0.162)		(0.248)		(0.308)		(0.283)	
t-3	-0.0200		0.255		-0.100		-0.415	
	(0.153)		(0.236)		(0.283)		(0.271)	
t-2	0.158		0.293		0.0157		0.0193	
	(0.139)		(0.214)		(0.256)		(0.251)	
Event	-6.769	***	-7.200	***	-7.047	***	-5.792	***
	(0.166)		(0.251)		(0.315)		(0.296)	
t+1	-1.803	***	-1.861	***	-2.360	***	-1.270	***
	(0.156)		(0.240)		(0.300)		(0.271)	
Intercept	6.424	***	5.855	***	6.452	***	7.227	***
	(0.100)		(0.154)		(0.188)		(0.178)	
Obs	69,530		29,756		20,544		20,800	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROI. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

Table 3b: The impact of COVID-19 on the ROE of firms operating in the accommodation and catering services sector

Time relative to COVID-19 event	ROE		ROE North		ROE Centre		ROE South	
t-7	-1.833	***	-2.837	***	-1.317		-0.726	
	(0.458)		(0.721)		(0.821)		(0.809)	
t-6	1.068	**	0.755		0.722		1.637	**
	(0.427)		(0.674)		(0.769)		(0.752)	
t-5	4.121	*	5.230	**	3.161	**	3.4846	*
	(0.408)		(0.649)		(0.725)		(0.727)	
t-4	3.604	**	4.305	**	2.799	*	3.340	**
	(0.392)		(0.621)		(0.703)		(0.695)	
t-3	2.647		3.691		1.238		2.653	
	(0.362)		(0.566)		(0.650)		(0.657)	
t-2	1.829		1.785		1.212		2.386	
	(0.324)		(0.507)		(0.584)		(0.587)	
Event	-11.48	***	-11.60	***	-11.67	***	-10.91	***
	(0.394)		(0.605)		(0.745)		(0.694)	
t+1	1.069	***	1.844	***	0.117		0.861	
	(0.373)		(0.583)		(0.694)		(0.652)	
Intercept	9.188	***	7.536	***	9.496	***	11.29	***
	(0.224)		(0.355)		(0.398)		(0.398)	
Obs	137,085		57,183		42,055		40,971	

Note. The Table reports the panel event study estimates using a dynamic fixed-effect model specification for ROE. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

Similarly, in Tables 4a and 4b we note that the effect of the spread of the virus has the same negative impact on the profitability indicators for firms operating in the rental, travel agency and business support services sectors in Italy.

Table 4a: The impact of COVID-19 on the ROI of firms operating in the rental, travel agencies, business support services sector

Time relative to COVID-19 event	ROI		ROI North		ROI Centre		ROI South	
t-7	-0.553	**	-0.836	**	0.0880		-0.820	
	(0.257)		(0.342)		(0.500)		(0.574)	
t-6	-0.156		-0.214		0.279		-0.634	
	(0.254)		(0.335)		(0.503)		(0.565)	
t-5	0.290		0.170		0.436		0.216	
	(0.238)		(0.317)		(0.468)		(0.522)	
t-4	0.421	*	0.303		0.630		0.232	
	(0.221)		(0.309)		(0.415)		(0.460)	
t-3	0.273		0.319		0.249		0.0420	
	(0.212)		(0.287)		(0.401)		(0.460)	
t-2	0.449		0.503		0.309		0.306	
	(0.193)		(0.264)		(0.376)		(0.408)	
Event	-3.053	***	-3.325	***	-3.253	***	-2.224	***
	(0.220)		(0.305)		(0.415)		(0.462)	
t+1	-0.972	***	-1.076	***	-0.893	**	-0.820	*
	(0.213)		(0.297)		(0.403)		(0.449)	
Intercept	8.581	***	8.619	***	8.296	***	8.922	***
	(0.142)		(0.196)		(0.271)		(0.302)	
Obs	36,388		18,516		9,864		8,789	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROI. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. Significance: *** p<.01, ** p<.05, *p<.10

The pandemic has also severely affected the arts, cultural and intellectual activities sector, which were subjected to a harsh and lengthy lockout: in fact, as of March 2020, all cultural facilities were closed, and on-site activities were suspended. Although demand for cultural and creative content intensified during the lockdown period, and digital access became more critical than ever before (Radermecker, 2020), this sector has been one of the hardest hits and probably one of the slowest to recover.

The estimates shown in Tables 5a and 5b suggest a significant negative impact of COVID-19, which has indiscriminately affected businesses operating in these sectors throughout the peninsula. The indicator of the ROI declined by about 6 pp during the first year of the pandemic and a further decline of just under

2 pp in 2021. As regards ROE, this declined by about 7 pp in 2020, with no statistically significant recovery in the second year of the pandemic.

Table 4b: The impact of COVID-19 on the ROE of firms operating in the rental, travel agencies, business support services sector

Time relative to COVID-19 event	ROE		ROE North		ROE Centre		ROE South	
t-7	-0.0151		-0.418		-0.640		1.410	
	(0.532)		(0.716)		(1.025)		(1.178)	
t-6	1.611	***	1.406	**	0.482		3.070	***
	(0.505)		(0.683)		(0.972)		(1.096)	
t-5	3.708	***	3.535	***	3.460	***	4.070	***
	(0.472)		(0.647)		(0.905)		(1.010)	
t-4	2.793	*	3.367	**	2.058	**	2.205	**
	(0.450)		(0.617)		(0.846)		(0.975)	
t-3	2.382		2.757		1.824	*	2.199	
	(0.428)		(0.568)		(0.835)		(0.933)	
t-2	1.390		1.960		0.630		0.765	
	(0.395)		(0.522)		(0.757)		(0.881)	
Event	-3.670	***	-3.938	***	-4.033	***	-2.524	***
	(0.425)		(0.590)		(0.808)		(0.883)	
t+1	0.211	***	0.293	***	-0.0751		0.619	
	(0.429)		(0.586)		(0.824)		(0.914)	
Intercept	12.17	***	11.80	***	11.84	***	13.25	***
	(0.273)		(0.372)		(0.508)		(0.597)	
Obs	77,985		38,078		21,696		19,769	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROE. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

Table 5a: The impact of COVID-19 on the ROI of firms operating in the artistic, sports, and entertainment activities sector

Time relative to COVID-19 event	ROI		ROI North		ROI Centre		ROI South	
t-7	-0.731		-0.734		-1.183		-0.0685	
	(0.470)		(0.690)		(0.866)		(0.915)	
t-6	-0.806	*	-0.928		-1.384		0.136	
	(0.474)		(0.702)		(0.842)		(0.924)	
t-5	-0.280		0.616		-1.236		-0.878	
	(0.454)		(0.699)		(0.802)		(0.832)	
t-4	0.274		0.721		0.452		-0.523	
	(0.411)		(0.610)		(0.729)		(0.794)	
t-3	0.739*		0.672		0.625		0.978	
	(0.388)		(0.571)		(0.738)		(0.732)	
t-2	0.689		1.016		0.592		0.612	
	(0.376)		(0.536)		(0.726)		(0.737)	
Event	-5.874	***	-7.019	***	-5.821	***	-4.060	***
	(0.441)		(0.659)		(0.835)		(0.795)	
t+1	-2.138	***	-2.847	***	-1.706	**	-1.258	
	(0.433)		(0.643)		(0.845)		(0.773)	
Intercept	5.759	***	5.473	***	5.634	***	6.060	***
	(0.270)		(0.397)		(0.503)		(0.512)	
Obs	11,496		5,226		3,122		3,433	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROI. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

Table 5b: The impact of COVID-19 on the ROE of firms operating in the artistic, sports, entertainment, and entertainment activities sector

Time relative to COVID-19 event	ROE		ROE North		ROE Centre		ROE South	
t-7	-0.663		-0.459		-3.447	*	0.726	
	(1.095)		(1.674)		(1.993)		(1.971)	
t-6	2.617	**	2.263		-1.959		6.594	***
	(1.017)		(1.533)		(1.959)		(1.803)	
t-5	4.873	***	5.715	***	2.383		5.161	***
	(0.946)		(1.363)		(1.815)		(1.808)	
t-4	3.794	***	4.349	**	3.424	**	2.791	
	(0.900)		(1.347)		(1.636)		(1.711)	
t-3	5.022		4.685	*	3.906		5.867	
	(0.816)		(1.200)		(1.522)		(1.543)	
t-2	2.671		3.300		0.364		3.138	
	(0.770)		(1.120)		(1.495)		(1.430)	
Event	-9.371	***	-12.38	***	-7.527	***	-7.327	***
	(0.904)		(1.455)		(1.626)		(1.541)	
t+1	-0.363		0.278		-0.726		-1.198	
	(0.868)		(1.365)		(1.575)		(1.523)	
Intercept	7.563	***	6.179	***	7.050	***	10.25	***
	(0.527)		(0.798)		(0.989)		(0.957)	
Obs	24,650		10,775		6,767		7,756	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROE. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

Similar but smaller results are obtained, if we look at the impact of the pandemic on the firms operating in the professional, scientific, and technical activities sector, which are reported in Tables 6a and 6b.

Table 6a: The impact of COVID-19 on the ROI of firms operating in the professional, scientific, and technical activities sector

Time relative to COVID-19 event	ROI		ROI North		ROI Centre		ROI South	
t-7	0.315		0.314		0.857	*	-0.238	
	(0.197)		(0.242)		(0.439)		(0.511)	
t-6	0.390	**	0.349		0.780	*	0.304	
	(0.194)		(0.238)		(0.435)		(0.498)	
t-5	0.593	**	0.685	**	0.602		0.356	
	(0.184)		(0.227)		(0.404)		(0.475)	
t-4	0.639	**	1.015	**	0.0801		-0.107	
	(0.178)		(0.224)		(0.387)		(0.427)	
t-3	0.718		1.008		0.256		0.253	
	(0.163)		(0.206)		(0.347)		(0.394)	
t-2	0.517		0.612		0.775		-0.126	
	(0.154)		(0.194)		(0.321)		(0.376)	
Event	-2.103	***	-2.155	***	-2.243	***	-1.560	***
	(0.163)		(0.208)		(0.362)		(0.372)	
t+1	-0.686	***	-0.578	**	-1.062	***	-0.477	
	(0.164)		(0.210)		(0.351)		(0.378)	
Intercept	7.915	***	7.675	***	8.091	***	8.448	***
	(0.111)		(0.140)		(0.245)		(0.261)	
Obs	51,764		32,152		11,452		8,997	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROI. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

Table 6b: The impact of COVID-19 on the ROE of firms operating in the professional, scientific, and technical activities sector

Time relative to COVID-19 event	ROE		ROE North		ROE Centre		ROE South	
t-7	-0.181		-0.854	*	0.130		2.569	***
	(0.393)		(0.489)		(0.853)		(0.992)	
t-6	0.827	**	0.387		1.108		2.695	***
	(0.378)		(0.476)		(0.787)		(0.957)	
t-5	2.832	***	2.312	***	2.494		4.941	***
	(0.354)		(0.443)		(0.759)		(0.897)	
t-4	1.856	***	1.891	***	1.170		2.722	***
	(0.337)		(0.422)		(0.734)		(0.826)	
t-3	2.362	**	2.578	**	1.575	*	2.182	**
	(0.317)		(0.399)		(0.685)		(0.769)	
t-2	2.140		2.388		1.650		1.948	*
	(0.289)		(0.364)		(0.610)		(0.722)	
Event	-2.253	***	-2.635	***	-2.435	***	-0.754	
	(0.298)		(0.381)		(0.627)		(0.716)	
t+1	0.449		0.292		-0.241		2.274	***
	(0.309)		(0.389)		(0.663)		(0.758)	
Intercept	12.38	***	12.67	***	12.49	***	10.98	***
	(0.203)		(0.256)		(0.433)		(0.493)	
Obs	108,201		66,087		24,935		18,825	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROE. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

In addition, the decision to limit international, regional, and local travel with the objective of carrying out health controls, have also jeopardized the transportation industry, which heavily depends on the mobility of people (Yang et al., 2020). Overall, both passenger transport and freight have suffered severe setbacks from the pandemic. Our findings reported in Tables 7a and 7b suggest that the impact of the COVID-19 outbreak was negative on the profitability indicators. However, a slight recovery in 2021 in the ability to generate profits is estimated for firms operating in the north; in fact, the coefficient is not statistically different from zero when looking at the impact on ROI, while it is positive and statistically significant when looking at ROE.

Table 7a: The impact of COVID-19 on the ROI of firms operating in the transport and warehousing sector

Time relative to COVID-19 event	ROI		ROI North		ROI Centre		ROI South	
t-7	0.232		0.220		-0.0435		0.546	
	(0.251)		(0.335)		(0.575)		(0.477)	
t-6	0.802	***	0.939	*	0.527		0.858	*
	(0.249)		(0.339)		(0.574)		(0.453)	
t-5	1.661	***	1.895	***	0.851		1.902	***
	(0.233)		(0.315)		(0.540)		(0.422)	
t-4	1.896	***	2.130	***	1.378	***	1.928	**
	(0.218)		(0.310)		(0.473)		(0.386)	
t-3	1.389	*	1.781	*	1.232	**	1.039	*
	(0.204)		(0.288)		(0.457)		(0.356)	
t-2	0.230		0.382		0.129		0.123	
	(0.190)		(0.269)		(0.425)		(0.330)	
Event	-1.964	***	-1.746	***	-2.848	***	-1.565	***
	(0.207)		(0.298)		(0.438)		(0.364)	
t+1	-0.310		0.364		-0.866	**	-0.845	**
	(0.204)		(0.291)		(0.441)		(0.359)	
Intercept	7.409	***	6.974	***	7.618	***	7.863	***
	(0.137)		(0.195)		(0.305)		(0.236)	
Obs	35,651		16,680		7,853		11,820	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROI. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

Table 7b: The impact of COVID-19 on the ROE of firms operating in the transport and warehousing sector

Time relative to COVID-19 event	ROE		ROE North		ROE Centre		ROE South	
t-7	2.673	***	0.245		4.146		5.304***	**
	(0.554)		(0.814)		(1.147)		(0.967)	
t-6	5.200	***	3.032	***	5.707		8.365	***
	(0.518)		(0.742)		(1.114)		(0.914)	
t-5	7.495	***	6.320	***	9.390	***	7.905	***
	(0.490)		(0.713)		(1.028)		(0.860)	
t-4	6.253	***	5.240	***	7.294	***	7.003	***
	(0.467)		(0.697)		(0.941)		(0.813)	
t-3	4.388	**	4.028	*	5.593	*	4.298	*
	(0.437)		(0.651)		(0.900)		(0.749)	
t-2	1.294		1.030		2.453		1.042	
	(0.403)		(0.597)		(0.846)		(0.689)	
Event	-3.683	***	-3.779	***	-4.733	***	-2.510	***
	(0.448)		(0.663)		(0.980)		(0.742)	
t+1	0.286		1.552	**	0.216		-1.240	*
	(0.445)		(0.652)		(0.993)		(0.735)	
Intercept	10.16	***	9.610	***	8.986	***	11.39	***
	(0.288)		(0.433)		(0.605)		(0.483)	
Obs	65,395		28,908		14,955		22,842	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROE. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

The outbreak of pandemic affected the manufacturing sector, as expected. The extent of disruption was largely twofold: an endogenous disruption of production processes and systems and extreme shifts in supply and demand caused by an exogenous supply chain disruption. Due to supply chain disruption and the unavailability of raw material, some industries, such as electronics, have put new product development on hold and have also reduced production quantities (Ivanov and Dolgui, 2020). Therefore, the pandemic has paralyzed the

manufacturing sector, negatively impacting firms' profitability. Tables 8a show that ROI decreased not only during the first year of the health crisis, but also during the following year, while the results reported in Table 8b suggest, that profitability as measured by the ROE indicator would appear to have declined by about 5 pp; while a more pronounced reduction is estimated for firms operating in central Italy, with a 6 pp decrease from the year 2019.

Table 8a: The impact of COVID-19 on the ROI of firms operating in the manufacturing sector

Time relative to COVID-19 event	ROI		ROI North		ROI Centre		ROI South	
t-7	-0.278	***	-0.290	***	0.144		-0.602	***
	(0.0895)		(0.112)		(0.207)		(0.197)	
t-6	0.318	***	0.450	***	0.421	**	-0.250	
	(0.0861)		(0.108)		(0.198)		(0.194)	
t-5	0.697	***	0.789	***	0.832	***	0.261	
	(0.0830)		(0.104)		(0.191)		(0.185)	
t-4	1.034	***	1.294	***	0.983	***	0.165	
	(0.0792)		(0.100)		(0.181)		(0.176)	
t-3	1.069	**	1.421	*	0.973	**	-0.0892	
	(0.0747)		(0.0948)		(0.172)		(0.163)	
t-2	0.834		1.126	*	0.682	*	-0.0230	
	(0.0683)		(0.0862)		(0.155)		(0.153)	
Event	-2.958	***	-2.937	***	-3.381	***	-2.517	***
	(0.0756)		(0.0946)		(0.176)		(0.170)	
t+1	-0.290	***	-0.138		-0.580	***	-0.496	***
	(0.0755)		(0.0952)		(0.174)		(0.168)	
Intercept	7.927	***	7.884	***	7.879	***	8.021	***
	(0.0509)		(0.0648)		(0.116)		(0.109)	
Obs	190,287		120,482		37,796		47,875	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROI. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

Table 8b: The impact of COVID-19 on the ROE of firms operating in the manufacturing sector

Time relative to COVID-19 event	ROE		ROE North		ROE Centre		ROE South	
t-7	-1.075	***	-1.680	***	-0.264		0.631	
	(0.205)		(0.259)		(0.458)		(0.470)	
t-6	0.974	**	0.400		1.678	***	2.311	***
	(0.197)		(0.248)		(0.447)		(0.452)	
t-5	3.212	***	2.786	***	3.552	***	4.331	***
	(0.188)		(0.236)		(0.426)		(0.431)	
t-4	3.203	***	3.195	***	3.637	***	2.883	***
	(0.178)		(0.223)		(0.393)		(0.415)	
t-3	3.879	*	4.380	**	3.805	*	2.402	**
	(0.171)		(0.214)		(0.379)		(0.403)	
t-2	2.481		3.036		2.229		1.105	
	(0.154)		(0.194)		(0.339)		(0.358)	
Event	-5.358	***	-5.426	***	-5.951	***	-4.282	***
	(0.174)		(0.218)		(0.391)		(0.401)	
t+1	-0.0803		0.346	***	-0.561		-0.757	*
	(0.170)		(0.213)		(0.380)		(0.400)	
Intercept	10.38	***	10.04	***	10.20	***	11.42	***
	(0.112)		(0.142)		(0.248)		(0.254)	
Obs	314,518		190,805		68,774		61,094	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROE. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

The pandemic and subsequent lockdown resulted in social distancing and isolation that had a detrimental effect on the wholesale and retail sector, despite sales of small and medium-sized supermarket chains increased in a short period of time, as severe pandemic measures led to the closure of high population densities malls and supermarkets. In addition, the unprecedented systematic uncertainty resulting from the combination of uncertainty about the duration of the crisis, the expectations for income and employment caused people to reduce current consumption and increase savings, making the situation worse. Results reported in Tables 9a and 9b, suggest that the pandemic outbreak has had a large impact on the Italian firms of the wholesale and retail sector, with ROI falling by

2.5 pp in 2020, and a reduction of ROE of about 3 pp. In addition to all the problems caused by the pandemic, it has accelerated the online presence of retail enterprises. However, many traditional retail enterprises were unable to develop online platforms, and carry on the business, which resulted in cash flow constraints that have brought many businesses to the brink of bankruptcy. As a result, the government has taken a series of measures for economic support especially for the wholesale and retail sector, which has been particularly hard hit by the COVID-19 shock, and this could explain the estimated improvement in both profitability indicators, in 2021.

Table 9a: The impact of COVID-19 on the ROI of firms operating in the wholesale and retail, repair of motor vehicles and motorcycles sector

Time relative to COVID-19 event	ROI		ROI North		ROI Centre		ROI South	
t-7	-0.578	***	-0.876	***	-0.394	**	-0.176	
	(0.0926)		(0.131)		(0.196)		(0.172)	
t-6	-0.0828		-0.140		-0.0665		0.0230	
	(0.0891)		(0.127)		(0.186)		(0.163)	
t-5	0.512	***	0.484	***	0.343	*	0.695	***
	(0.0838)		(0.119)		(0.179)		(0.152)	
t-4	0.779	***	0.922	***	0.502	***	0.753	***
	(0.0792)		(0.113)		(0.169)		(0.143)	
t-3	0.440	**	0.826	**	0.118		0.0257	
	(0.0744)		(0.109)		(0.154)		(0.132)	
t-2	0.369		0.538		0.229	*	0.200	*
	(0.0666)		(0.0968)		(0.139)		(0.117)	
Event	-2.470	***	-2.348	***	-3.095	***	-2.177	***
	(0.0764)		(0.109)		(0.165)		(0.134)	
t+1	0.0320		0.502	***	-0.336	**	-0.397	
	(0.0746)		(0.110)		(0.157)		(0.129)	
Intercept	7.986	***	7.690	***	7.866	***	8.551	***
	(0.0495)		(0.0726)		(0.104)		(0.0860)	
Obs	188,434		89,106		45,352		57,480	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROI. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

Table 9b: The impact of COVID-19 on the ROE of firms operating in the wholesale and retail, repair of motor vehicles and motorcycles sector

Time relative to COVID-19 event	ROE		ROE North		ROE Centre		ROE South	
t-7	-0.761	***	-1.835	***	-0.618		1.158	***
	(0.214)		(0.311)		(0.439)		(0.386)	
t-6	1.063	***	0.0293		0.867	**	3.073	***
	(0.201)		(0.293)		(0.411)		(0.359)	
t-5	3.298	***	2.767	**	3.087	**	4.454	***
	(0.192)		(0.280)		(0.398)		(0.336)	
t-4	2.728	**	2.720	***	2.540	***	2.958	**
	(0.185)		(0.269)		(0.381)		(0.326)	
t-3	2.264		2.830	*	1.896	*	1.755	*
	(0.175)		(0.259)		(0.361)		(0.306)	
t-2	1.303		1.604		1.125		1.045	
	(0.159)		(0.234)		(0.329)		(0.275)	
Event	-3.244	***	-2.453	***	-4.132	***	-3.758	***
	(0.178)		(0.260)		(0.369)		(0.310)	
t+1	0.884	***	2.232	***	0.205		-0.408	
	(0.173)		(0.254)		(0.359)		(0.299)	
Intercept	10.48	***	9.292	***	10.08	***	12.44	***
	(0.113)		(0.168)		(0.234)		(0.192)	
Obs	326,309		146,391		83,463		102,839	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROE. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

In addition, COVID-19 has completely disrupted any previous daily practice also in the construction industry, for example architects left the office and began completing the design stage remotely. Therefore, the pandemic has had a severe impact on the ability of contractors to work on-site and to meet deadlines. Some sites were suspended, there have been delays in payments and in the delivery of materials, all this has led to a lack of cash, manpower, and resources in general,

creating a chain of delays, loss of productivity and profitability, as shown in Tables 10a and 10b.

However, since July 2020, with the desire to restart the construction sector strongly penalized by the pandemic, it has been implemented a public grant policy, so called "*Superbonus 110%*", (Italian Law. L. 17 July, 2020) that by cutting costs for property owners strongly encouraged energy efficiency works. Indeed, as we can see from the Tables 10a and 10b, in 2021 than 2019, the profitability of the construction industries increases.

Table 10a: The impact of COVID-19 on the ROI of firms operating in the construction sector

Time relative to COVID-19 event	ROI		ROI North		ROI Centre		ROI South	
t-7	-0.0679		-0.396	**	0.572	**	-0.146	
	(0.128)		(0.195)		(0.254)		(0.217)	
t-6	-0.242	*	-0.502	***	-0.0231		-0.0497	
	(0.126)		(0.192)		(0.253)		(0.212)	
t-5	0.411	***	0.311	*	0.251		0.646	***
	(0.121)		(0.179)		(0.243)		(0.211)	
t-4	0.462	***	0.476	***	0.788	***	0.221	
	(0.116)		(0.176)		(0.236)		(0.192)	
t-3	0.285	*	0.551	**	0.352		-0.103	
	(0.111)		(0.167)		(0.225)		(0.186)	
t-2	0.422		0.545		0.361		0.267	
	(0.101)		(0.152)		(0.209)		(0.165)	
Event	-1.845	***	-1.927	***	-2.120	***	-1.557	***
	(0.108)		(0.165)		(0.219)		(0.180)	
t+1	0.910	***	0.830	***	0.697	***	1.104	***
	(0.110)		(0.167)		(0.224)		(0.185)	
Intercept	8.865	***	8.835	***	8.687	***	9.053	***
	(0.0747)		(0.114)		(0.149)		(0.124)	
Obs	103,855		45,819		25,593		35,414	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROI. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

Table 10b: The impact of COVID-19 on the ROE of firms operating in the construction sector

Time relative to COVID-19 event	ROE		ROE North		ROE Centre		ROE South	
t-7	-0.0185		-1.360	***	0.257	***	1.544***	
	(0.274)		(0.422)		(0.533)		(0.469)	
t-6	0.439	*	-1.217	***	0.118		2.869	**
	(0.260)		(0.399)		(0.516)		(0.434)	
t-5	4.104	***	2.922	***	3.574	***	5.942	***
	(0.251)		(0.383)		(0.507)		(0.427)	
t-4	2.691	***	3.183	***	2.593	***	2.150	***
	(0.239)		(0.367)		(0.463)		(0.411)	
t-3	2.238		2.734		2.246		1.769	
	(0.226)		(0.349)		(0.441)		(0.382)	
t-2	1.469		2.042		1.691		0.758	
	(0.206)		(0.306)		(0.413)		(0.356)	
Event	-3.278	***	-3.462	***	-4.409	***	-2.136	***
	(0.212)		(0.322)		(0.426)		(0.360)	
t+1	4.012	***	3.250	***	4.254	***	4.812	***
	(0.216)		(0.336)		(0.426)		(0.363)	
Intercept	14.24	***	14.21	***	14.27	***	14.18	***
	(0.144)		(0.222)		(0.278)		(0.244)	
Obs	212,817		90,963		55,183		72,426	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROE. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

The analysis proceeds, distinguishing these branches of the economy from other sectors such as agriculture and mining, which were able to continue operating during the COVID-19 pandemic, albeit not as usual, but with rather limited restrictions. Despite government restrictions on agricultural labor mobility, the establishment of safety protocols to prevent virus transmission, the trade and provision of essential items has been ensured and normalized. Indeed, results reported in Tables 11a and 11b, suggest that the pandemic slightly reduced the profitability of the firms operating in the agriculture, forestry and fishing sector, but with no statistically significant impact on ROE for enterprises operating in northern and southern Italy. In contrast, for firms operating in central

Italy, for which the pandemic caused a reduction in profitability, this effect may have been driven by the complete closure of only those firms operating in the forestry and logging subsector, which are more prevalent in central Italy.

Table 11a: The impact of COVID-19 on the ROI of firms operating in the agriculture, forestry, and fishing sector

Time relative to COVID-19 event	ROI	ROI North	ROI Centre	ROI South
t-7	0.201	0.121	-0.641 *	0.816 *
	(0.238)	(0.383)	(0.389)	(0.422)
t-6	-0.174	0.216	-0.489	-0.292
	(0.238)	(0.388)	(0.372)	(0.423)
t-5	-0.168	-0.0502	-0.500	-0.0858
	(0.232)	(0.372)	(0.390)	(0.409)
t-4	0.409 *	0.452	0.401	0.359
	(0.217)	(0.351)	(0.341)	(0.384)
t-3	-0.0494	0.146	-0.441	0.00742
	(0.212)	(0.342)	(0.316)	(0.381)
t-2	0.0273	0.322	0.204	-0.302
	(0.189)	(0.298)	(0.277)	(0.341)
Event	-0.703 ***	-0.516 *	-0.559 *	-0.901 **
	(0.200)	(0.286)	(0.339)	(0.360)
t+1	0.0864	0.177	0.304	-0.210
	(0.204)	(0.320)	(0.341)	(0.357)
Intercept	2.518 ***	2.297 ***	0.879 ***	3.73 ***
	(0.140)	(0.221)	(0.221)	(0.251)
Obs	21,146	6,787	5,803	8,975

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROI. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

Table 11b: The impact of COVID-19 on the ROE of firms operating in the agriculture, forestry, and fishing sector

Time relative to COVID-19 event	ROE		ROE North		ROE Centre		ROE South	
t-7	2.234	***	1.438		0.698		3.584	***
	(0.720)		(1.135)		(1.356)		(1.176)	
t-6	0.920		-0.155		-0.383		2.303	**
	(0.710)		(1.196)		(1.344)		(1.119)	
t-5	1.791	***	0.501		1.889		2.643	**
	(0.659)		(1.078)		(1.235)		(1.050)	
t-4	2.738	***	2.843	***	1.729		3.249	***
	(0.663)		(1.023)		(1.257)		(1.076)	
t-3	1.831	*	2.490	*	0.160		2.135	*
	(0.611)		(1.002)		(1.132)		(0.975)	
t-2	0.878		1.687		1.961		-0.258	
	(0.564)		(0.885)		(1.041)		(0.914)	
Event	-1.026	*	-0.264		-1.810	*	-0.941	
	(0.578)		(0.938)		(1.074)		(0.925)	
t+1	0.570		1.130		0.122		0.495	
	(0.579)		(0.942)		(1.150)		(0.900)	
Intercept	3.094	***	2.210	***	-2.01	***	6.562	***
	(0.396)		(0.625)		(0.753)		(0.633)	
Obs	32,613		9,873		8,479		14,873	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROE. In parentheses, standard errors clustered at the firm level. The p-value of the F-test is less than the significance level, the model is significant. The baseline year is 2019. Significance: *** p<.01, ** p<.05, *p<.10

In Tables 12a and 12b we can see estimates for the mining industry, which are negatively affected by the COVID-19 crisis, although many mines have remained operational and productive during the pandemic, despite having less people on site. However, business continuity has come at a cost due to the added expenses of new processes, procedures, health protocols, and so on, (Gałaś, et al., 2021; Jowitt, 2021).

Table 12a: The impact of COVID-19 on the ROI of firms operating in the extraction of minerals from quarries and mines

Time relative to COVID-19 event	ROI		ROI North		ROI Centre		ROI South	
t-7	-0.804		-1.868	*	-0.323		-0.0881	
	(0.742)		(1.108)		(1.310)		(1.392)	
t-6	-0.108		-0.795		0.0349		0.301	
	(0.752)		(1.096)		(1.398)		(1.449)	
t-5	-0.605		-1.390		-0.744		0.887	
	(0.713)		(1.056)		(1.451)		(1.202)	
t-4	-0.131		-1.866	*	0.689		1.284	
	(0.698)		(1.072)		(1.240)		(1.242)	
t-3	-0.689		-1.290		-0.143		-0.407	
	(0.628)		(0.910)		(0.910)		(1.343)	
t-2	-0.0848		-0.428		0.834		-0.320	
	(0.537)		(0.737)		(1.034)		(1.046)	
Event	-1.52	**	-1.804	**	-2.855	**	-0.219	
	(0.601)		(0.811)		(1.250)		(1.081)	
t+1	-0.169		-0.381		-1.869		1.262	
	(0.662)		(0.901)		(1.246)		(1.304)	
Intercept	4.374	***	4.772***	***	4.734	***	3.885	***
	(0.446)		(0.661)		(0.750)		(0.858)	
Obs	2,350		1,108		598		723	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROI. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

Table 12b: The impact of COVID-19 on the ROE of the firms operating in the extraction of minerals from quarries and mines

Time relative to COVID-19 event	ROE		ROE North		ROE Centre		ROE South	
t-7	-0.793		-0.0644		-0.876		-1.324	
	(1.817)		(2.169)		(3.434)		(4.033)	
t-6	2.778	*	1.556		2.908		5.636	
	(1.677)		(2.370)		(2.982)		(3.507)	
t-5	3.234	*	-0.120		4.091		8.358	***
	(1.663)		(2.518)		(3.348)		(2.946)	
t-4	-0.858		-3.777	*	0.252		4.006	
	(1.700)		(2.274)		(3.411)		(3.420)	
t-3	0.352		1.391		0.336		-0.311	
	(1.582)		(1.888)		(3.245)		(3.472)	
t-2	2.209		0.859		6.125	*	2.138	
	(1.416)		(1.941)		(2.594)		(2.941)	
Event	-2.625		-2.890		-2.280		-1.684	
	(1.613)		(2.163)		(2.902)		(3.335)	
t+1	1.790		1.842		-1.424		4.979	
	(1.694)		(2.467)		(3.050)		(3.278)	
Intercept	2.360	**	2.780	**	1.857		1.129	
	(1.043)		(1.336)		(2.064)		(2.208)	
Obs	3,459		1,550		917		1,103	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROE. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

As for the power sector, the pandemic had a relatively small impact on these economic activities (Tables 13a and 13b); and similarly, for the water supply sector (Tables 14a and 14b). Indeed, while the lockdown measures depressed consumption in the commercial and industrial sectors, they increased demand in the residential sector (Renukappa et al., 2021).

Table 13a: The impact of COVID-19 on the ROI of firms operating in the supply of electricity, gas, steam and air conditioning sector

Time relative to COVID-19 event	ROI		ROI North		ROI Centre		ROI South	
t-7	1.334	*	1.809	*	1.060		1.036	
	(0.707)		(0.958)		(1.552)		(1.319)	
t-6	1.276	**	1.722	**	0.281		1.199	
	(0.618)		(0.840)		(1.153)		(1.236)	
t-5	0.181		0.304		-0.542		0.931	
	(0.620)		(0.804)		(1.469)		(1.312)	
t-4	0.343		0.0572		0.976		0.740	
	(0.564)		(0.766)		(1.165)		(1.093)	
t-3	0.767		0.463		1.304		1.613	
	(0.525)		(0.720)		(1.054)		(1.048)	
t-2	0.340		-0.349		1.878	**	0.732	
	(0.485)		(0.666)		(0.908)		(0.970)	
Event	-1.214	***	-1.065	*	-1.556		-1.732	**
	(0.422)		(0.547)		(1.009)		(0.869)	
t+1	-1.385	**	-0.456	***	-3.064	**	-2.881	***
	(0.551)		(0.761)		(1.187)		(1.022)	
Intercept	6.684	***	6.636***	***	6.788	***	6.835	***
	(0.356)		(0.478)		(0.731)		(0.735)	
Obs	3,371		1,982		647		849	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROI. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

Table 13b: The impact of COVID-19 on the ROE of firms operating in the supply of electricity, gas, steam and air conditioning sector

Time relative to COVID-19 event	ROE		ROE North		ROE Centre		ROE South	
t-7	3.697	**	2.529		6.125		2.924	
	(1.624)		(1.975)		(4.545)		(3.307)	
t-6	1.331		-0.749		6.079		2.451	
	(1.613)		(2.071)		(4.003)		(2.989)	
t-5	0.198		-1.653		4.474		1.798	
	(1.410)		(1.745)		(3.857)		(2.574)	
t-4	0.619		-0.811		5.772		0.904	
	(1.458)		(1.794)		(3.666)		(2.977)	
t-3	0.476		-0.610		4.271		0.680	
	(1.282)		(1.626)		(3.396)		(2.295)	
t-2	0.781		-1.471		9.987	**	-0.599	
	(1.235)		(1.544)		(3.437)		(2.018)	
Event	-2.979	**	-3.830	**	1.822		-5.175	**
	(1.264)		(1.637)		(3.074)		(2.390)	
t+1	-1.387		-3.475	*	5.122		-2.181	
	(1.445)		(1.905)		(3.574)		(2.441)	
Intercept	12.19	***	13.26	***	8.807*	***	12.70	***
	(0.881)		(1.110)		(2.358)		(1.501)	
Obs	5,006		2,935		944		1,267	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROE. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

Table 14a: The impact of COVID-19 on the ROI of firms operating in the water supply; sewage networks, waste treatment and remediation activities sector

Time relative to COVID-19 event	ROI		ROI North		ROI Centre		ROI South	
t-7	-0.821	*	-1.439	**	0.218	**	-0.175	
	(0.450)		(0.621)		(0.964)		(0.809)	
t-6	-0.946	**	-1.557	**	0.787		-0.865	
	(0.445)		(0.619)		(1.064)		(0.744)	
t-5	-1.270	**	-1.424	*	0.0175		-1.575	*
	(0.439)		(0.556)		(1.051)		(0.842)	
t-4	-0.629		-1.003		0.646		-0.850	
	(0.444)		(0.586)		(1.010)		(0.823)	
t-3	0.712		0.177		2.490		0.628	
	(0.415)		(0.543)		(1.067)		(0.735)	
t-2	0.399		-0.0256		2.176	*	0.299	
	(0.391)		(0.537)		(0.857)		(0.694)	
Event	-0.632	*	-1.074	**	-0.613		-0.0762	
	(0.371)		(0.496)		(0.902)		(0.645)	
t+1	1.982	***	1.595	***	3.355	***	1.779	***
	(0.403)		(0.573)		(0.952)		(0.648)	
Intercept	8.184	***	8.757	***	6.741***	***	7.882***	***
	(0.269)		(0.377)		(0.649)		(0.439)	
Obs	7,400		3,731		1,467		2,465	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROI. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

Table 14b: The impact of COVID-19 on the ROE of firms operating in the water supply; sewage networks, waste treatment and remediation activities sector

Time relative to COVID-19 event	ROE		ROE North		ROE Centre		ROE South	
t-7	-1.961	*	-3.674	**	0.562		-0.291	
	(1.001)		(1.449)		(2.214)		(1.656)	
t-6	-1.129		-2.463		-0.420		0.864	
	(1.023)		(1.479)		(2.342)		(1.638)	
t-5	-1.599		-3.410	***	2.010		-0.728	
	(0.974)		(1.309)		(2.280)		(1.713)	
t-4	-2.826	**	-3.601	***	-0.892		-2.636	
	(0.951)		(1.314)		(2.040)		(1.722)	
t-3	0.619		-0.354		1.448		1.345	
	(0.926)		(1.366)		(2.076)		(1.566)	
t-2	1.453	*	0.581		2.101		2.248	
	(0.830)		(1.178)		(1.667)		(1.470)	
Event	-1.187		-0.546		-3.450	*	-1.312	
	(0.848)		(1.120)		(2.066)		(1.536)	
t+1	4.238	***	5.876	***	4.134	**	2.269	
	(0.850)		(1.240)		(1.863)		(1.427)	
Intercept	11.59	***	10.95	***	10.06	***	12.89	***
	(0.566)		(0.836)		(1.224)		(0.932)	
Obs	12,241		5,759		2,546		4,343	

Note. The table reports the panel event study estimates using a dynamic fixed-effect model specification for ROE. In parentheses, standard errors clustered at the firm level. The baseline year is 2019. The p-value of the F-test is less than the significance level, the model is significant. Significance: *** p<.01, ** p<.05, *p<.10

Overall, all companies have been severely affected by the pandemic outbreak, which is reflected mainly in declining stock prices, revenues, and profits. At the same time, however, government interventions to support the economic and financial balance of enterprises and the maintenance of employment levels, and the relaxation of lockdown measures mitigated the negative effects of the pandemic outbreak. The public subsidies and tax relief measures somewhat mitigated firm losses and had significant effect, but relatively mild compared to the size of the economic shock. Therefore, results also highlight the importance of public support measures in helping firms cope

with the pandemic. In the absence of such programs, pronounced sales losses would have threatened the liquidity and the survivability of firms and hence also the job security of employees (Janzen and Radulescu, 2022).

6. CONCLUSIONS

The COVID-19 pandemic had a considerable influence on business activities in almost all economic activities on the national level. However, the disruptions of the pandemic did not affect all enterprises equally. Therefore, it is necessary to explore how severely the industry sectors have been affected by the health crisis. To this end, we focus on investigating and analyzing the impacts of the pandemic at the sectoral and territorial levels on the quality of profitability, as measured by key financial metrics, such as ROI and ROE, of Italian firms. We use a robust empirical methodology in our analysis, the panel event study, which allows us to discern the influence of COVID-19 disruptions on the financial performance of Italian companies, by considering previous trends and potential variables that could distort this correlation.

We estimate that in 2020, the profitability indicators of all the considered sectors declined, but those that suffered most from the pandemic were the accommodation and food services, transportation, manufacturing, and cultural sectors, with a reduction in profitability ranging from 4 to 11 pp. In addition, the results highlight that the COVID-19 crisis was undoubtedly a regional crisis, with spatially uneven impacts, and with heavy negative effects especially for firms in the above sectors operating in the Northern and particularly in central Italy. When moving to 2021, we see a moderate recovery for Italian industries; the economic blow has been cushioned by the various government interventions to support the economy, with particular attention to the hardest hit sectors by the pandemic.

Overall, the results can be largely explained by the strictness of the anti-contagious policies, which caused disruptions in supply chains, prevented some purchases, and highlighted the inability of many industries in several sectors to transition to remote work, and online sales. In fact, these measures had a significant impact on several sectors, such as accommodation and food services, rental, travel agencies, business support services, and the arts and culture sector, which were forced to close, and on those businesses that could not benefit from remote work.

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APPENDIX

Table 1: Descriptive statistics for ROI

ROI	Mean								
	t-7	t-6	t-5	t-4	t-3	t-2	t-1	Event	t+1
	6.02	6.424	6.943	7.546	7.269	7.727	7.577	5.492	7.692
Sectors:									
Agriculture, forestry, and fishing	1.757	1.509	1.713	2.723	2.304	2.503	2.534	2.223	2.901
Mining of minerals from quarries and mines	2.553	3.540	3.163	3.567	3.423	3.978	4.349	3.328	4.817
Manufacturing	6.942	7.548	7.969	8.518	8.644	8.579	7.989	5.690	8.096
Supply of electricity, gas, steam and air conditioning	5.668	5.405	4.631	5.381	6.273	5.899	6.266	6.140	5.859
Water supply; sewage networks, waste Treatment and remediation activities	7.011	7.205	7.009	7.657	8.252	8.089	7.968	7.274	9.449
Construction	6.745	6.858	7.631	8.179	8.381	8.645	8.624	7.595	9.978
Wholesale and retail, repair of motor vehicles and motorcycles	6.465	7.014	7.696	8.284	8.232	8.398	8.280	6.271	8.765
Transport and Warehousing sector	6.604	7.249	8.201	8.841	8.417	7.686	7.772	6.128	7.822
Activities of accommodation and catering services	3.730	4.585	5.246	5.874	5.989	6.313	6.453	0.325	4.939
Professional, scientific, and technical activities	6.693	6.966	7.460	7.730	7.656	7.792	7.794	6.284	7.584
Rental, travel agencies, business support services	6.998	7.364	7.955	8.378	8.444	8.830	8.555	6.346	8.429
Artistic, sports, entertainment, and entertainment activities	3.936	4.299	4.715	5.346	6.014	5.784	5.795	0.750	4.021

Table 2: Descriptive statistics for ROE

ROE	Mean								
	t-7	t-6	t-5	t-4	t-3	t-2	t-1	Event	t+1
	5.937	7.921	10.972	11.297	12.141	12.286	11.586	8.711	14.186
Sectors:									
Agriculture, forestry, and fishing	1.445	0.728	2.301	3.779	3.968	3.436	3.158	3.159	4.690
Mining of minerals from quarries and mines	-0.484	2.469	3.281	-0.096	1.429	3.007	2.804	1.414	6.328
Manufacturing	6.076	8.503	11.352	12.037	13.302	12.785	11.089	6.872	12.349
Supply of electricity, gas, steam and air conditioning	12.893	8.898	6.329	8.161	7.621	8.581	9.728	8.088	11.253
Water supply; sewage networks, waste Treatment and remediation activities	7.300	8.249	8.477	7.898	10.863	12.188	11.212	11.176	16.262
Construction	7.642	8.976	13.534	13.207	14.237	14.611	14.361	12.491	20.571
Wholesale and retail, repair of motor vehicles and motorcycles	5.976	8.068	11.155	11.458	11.914	12.183	11.779	9.671	14.365
Transport and Warehousing sector	8.070	11.444	14.778	14.279	13.577	11.515	11.630	8.853	13.759
Activities of accommodation and catering services	2.278	5.973	9.699	10.316	10.332	11.037	10.582	0.739	13.108
Professional, scientific, and technical activities	7.973	9.622	12.260	12.285	13.315	14.387	13.243	11.734	15.506
Rental, travel agencies, business support services	7.415	9.691	12.804	12.977	13.154	12.773	13.438	10.755	15.344
Artistic, sports, entertainment, and entertainment activities	1.423	4.944	8.566	8.653	10.734	10.175	9.351	1.672	9.741