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Learning financial survival from disasters

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ABSTRACT

This study examines how firms learn financial survival from experience, and how stock markets price this learning. We study American firms during the Covid turmoil which had prior exposure to the 2008 Global Financial Crisis. Our results show firms exposed to the 2008 Crisis had 95% higher monthly stock returns during Covid compared to their unexposed peers. This highlights the role major crises play in shaping organisational resilience. The organisational learning we illustrate includes a strong element of CEO learning but is not exclusive to senior management. Our empirical findings are stronger for firms in 'shutdown sectors' and persist after controlling for state interventions, as well as other control factors and estimation windows.

1. Introduction

There is a substantial literature on organisational learning and leadership, and yet there have been few attempts to draw on this body of knowledge to better understand variations in corporate financial performance. The central question we ask in this paper is whether firms learn to fare better in a major crisis if they have already been exposed to a prior crisis with similarity in dimensions, consequences, and unanticipated nature. Our findings show that surviving such a prior crisis in the corporate world makes firms more resilient in the face of new disruptions and creates a larger imprint in their organisational memory (Marquis and Tilcsik, 2013), even over a period spanning more than a decade. Specifically, we identify firms that survived the 2008–09 Global Financial Crisis (hereafter, GFC) and track their performance during the Covid period. We also investigate whether the CEO is the main channel through which learning from a past crisis influences current firm behaviour. In addition, although it is well documented that certain sectors of the economy suffered more than others during Covid,[1] there still exist significant unexplained cross-sectional variations in each industry sector. In this paper, we draw on organisational learning from previous crises to differentiate these cross-sectional variations during the Covid turmoil.

There are, of course, some differences between the two crises we examine. The GFC was an economic crisis originating from within the financial system itself and with roots in the subprime mortgage sector, while Covid originated outside the financial system as a pandemic and had immediate impact on the shutdown sectors to contain the virus. GFC was primarily a large-firm crisis whereas Covid, at least initially, had more impact on smaller firms. Geographically, Covid spread from East to West whereas the GFC originated in the West and made its way to the East.

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[1] They include sectors such as travel, tourism, and hospitality (see, e.g., Izzeldin et al., 2021; Halling et al., 2020; Ramelli and Wagner, 2020; Salisu and Vo, 2020).

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All these considered, still the similarities between the two episodes are highly striking. Both crises were predominantly unanticipated in their scope if not their genesis, and both led to financial market turmoil and considerable interventions from governments and, particularly, regulators. Both disasters left an enormous economic bill for the taxpayers to sort out. Importantly, firms went through fundamentally similar crisis management procedures in both periods. Other similarities between the two include the shocks exerted on the workforce, management, office space, supply chains, share price and associated financial metrics. In fact, both episodes captured the media and the public imagination in similar ways, and in some cases, led to mass panic and hysteria.

We acknowledge that, in addition to macroeconomic crises, companies could have experienced several idiosyncratic crises throughout the years that may have contributed to creating and shaping this immunity. Thus, GFC may not be the leading factor of crisis experience for all firms. Hence, we only offer the GFC as a measure of – and not the ultimate barometer of – experience. Nevertheless, the GFC exposed firms to an intense and somewhat unique experience, thus providing a particularly appropriate choice for the shock befitting our study. It was more sudden than the two major crashes preceding it: the property crash of the late 1980 s and the currency crises of the late 1990 s. This was largely because of the central role played by banks in major market economies – that is, lending large volumes of money to each other as well as to governments, businesses and consumers. In fact, the shock, surprise and experience of the GFC was more intense than comparable events that preceded or followed it given the advent of 24-hour computerised trading, and the deregulation of the financial sector pre-2008, and the sudden drying up of capital flows. And while the GFC was a global crisis, it affected US firms in a pronounced way.

We fundamentally examine whether organisations experiencing the GFC developed mechanisms, implicitly or explicitly, to better cope with the next major crisis – Covid in this case. We show the imprint created by the GFC, and the learning that took place during and after the GFC enabled exposed firms to fare better during Covid. We also conjecture that this Covid-induced learning is likely to carry over to the next large unanticipated crisis of the future regardless of its nature.

Our findings show that firms exposed to the GFC earned about 95% more during Covid compared to their unexposed peers. This figure is both statistically and economically significant and represents billions of dollars of market value "saved" through learning from a previous crisis, albeit 12 years prior to the onset of Covid. In other words, we show the group of firms which were exposed to GFC were more resilient to the financial hit of Covid compared to their peers. We argue this may be due to such firms having learned how to cope with sudden shocks to their funding and capital structure, as well as their share price and associated financials, and having learned better crisis management and stakeholder communication, particularly in delivering bad news (Brennan, Edgar, and Power, 2022), as part of their organisational culture (e.g., Walsh and Ungson, 1991).

Interestingly, firms exposed to GFC outperform their peers in a difference-in-difference estimation of both stock returns and market-adjusted excess returns. After controlling for overall risk, exposed firms earn 86% higher raw returns and 90% higher excess returns compared to their peers during the first two months of the pandemic in the US. Upon controlling for Covid-specific risks, macroeconomic factors, state and government interventions, and fundamental firm characteristics, the outperformance of monthly returns goes down to about 80% which is still a remarkable difference statistically and economically. Even the peak of the pandemic, i.e., nine months into the Covid crisis, we still obtain strong and robust results across various industry sectors. Further, we find that the trading volume of exposed firms increases due to buying pressures in the market.

Our paper makes two important contributions to academic literature. *Firstly,* our findings contribute to the finance literature that examines stock market reactions to crises including pandemics (e.g., Suardi, Xu, and Zhou, 2022; Gofran, Gregoriou, and Haar, 2022; Ferriani, 2021). For example, studies such as McTier et al. (2013) show how markets react to influenza through time but do not highlight any cross-sectional variations among firms. Many other Covid-related studies that have recently been published (inter alia, Brodeur et al., 2021, provide a comprehensive review) fail to document inter-crisis links theoretically, and much less so empirically. Our paper contributes to this body of work by showing a novel relationship between firms' prior disaster exposures and their resilience during pandemics.

Secondly, we contribute to the management literature on organisational learning by showing that prior exposure to unprecedented and traumatic events can have organisational learning and resilience benefits over the long term, spanning more than a decade. This core finding contributes to the studies on the impact of organisational learning capabilities on a company's prospects for survival in the management and accounting literatures (see, e.g., Tosun, Eshraghi, and Muradoglu, 2021; Camps and Luna-Arocas, 2012; Argyris and Schön, 1996). For example, organisational learning can benefit a range of entities in terms of innovation, such as those experiencing adaptive learning and incremental innovation as well as those characterised by generative learning and radical innovation (Chiva et al., 2014). With respect to the financial services industry, prior research shows that market information processing and analytical capabilities of organisations improve when they exhibit more favourable learning values (Morgan and Turnell, 2003), however, this link has rarely been traced over more than a decade, as we show in this paper.

In summary, our study contributes to both finance and management literatures by highlighting the role organisational learning plays during a major crisis and between comparable crises. How firms learn how to respond to disasters and systemic shocks is central to our story. The remainder of the paper proceeds in the following sections. Section 2 provides the theoretical background and develops the formal hypotheses. Section 3 describes the data and empirical methodology. Sections 4 and 5 provide the baseline results as well additional tests to improve robustness of the findings. Finally, Section 6 concludes.

2. Theoretical background and hypotheses

The enormous public health impact and economic footprint of Covid has received much attention in the past few years. Many studies emphasise the need to anticipate and manage the economic consequences of pandemics such as Bloom, Cadarette, and Sevilla (2018); Lewis (2001); and Tam, Khan, and Legido-Quigley (2016) among others.[2] In this respect, we can draw parallels between the economic impact of the GFC and Covid. As for the GFC, it was among the five worst financial crises the world had experienced and led to a loss of more than $2 trillion from the global economy. Similarly, Covid resulted in a global GDP loss of 3.4% over 2020. With the global GDP estimated at around $84 trillion that year, this meant a loss of $2.8 trillion from the global economy, a comparable figure to that of the GFC.

While a substantial number of studies have been published linking Covid to a range of financial variables, very few in finance have drawn upon organisational literature to understand how companies learn from one crisis and apply this learning to the next. Organisational learning from disasters (Smith and Elliott, 2007; Tosun, Eshraghi, and Muradoglu, 2021) initially takes place at the level of senior managers who have to fire-fight the disaster at hand, and then trickles down the organisation. At the country level, the determinants of stock market immunity to Covid are, inter alia, laid out in Zaremba et al. (2021). They show that low unemployment, conservative investments, and limited valuations improve immunity to the pandemic, and that government policy responses generally provide support for stock markets in such times. At the firm level, Silva et al. (2022) show that that firms operating in non-critical industries had generally lower stock prices during the pandemic; and those with high leverage, high human resource management inefficiency, and low intangible intensity before the pandemic suffered even more. More generically, Cakici and Zaremba (2021) estimate firm exposure to a pandemic index representing global concerns of infectious diseases. They show that such a pandemic beta reliably predicts the cross-section of future stock returns. Last but not least, Ding et al. (2021) show that firms with less exposure to Covid through global supply chains and customer locations, higher corporate social responsibility, less entrenched executives, and stronger pre-2020 finances (proxied by more cash and undrawn credit, less total and short-term debt, and larger profits) had a softer landing during the Covid period.

We frame our study and findings on the widely cited concept of imprinting as used in management discourse. In their seminal study, Marquis and Tilcsik (2013) examine the concept of organisational imprinting, This construct is subsequently used quite heavily in the management literature and increasingly in the finance literature, such as in Ru, Yang and Zou (2021)'s study of the delayed attention and inaction in response to Covid among countries that did not experience SARS; Kim and Lee (2014)'s examination of the long-run impact of the Korean War trauma on risk aversion; or in Li et al (2022)'s study of countries experiencing severe disasters and their resilience against the Covid pandemic. In imprinting, the environment stamps the organisation in a noticeable way during a sensitive period. In other words, the environment exerts a significant influence on the organisation. A mapping of an environmental condition onto the organization takes place which may include features of the economic, technological, or institutional context as well as the "logics of organizing" that founders rely on when creating the new enterprise (Baron, Burton, & Hannan, 1999). In our context, we argue that the Global Financial Crisis of 2008 hit firms in a particularly 'sensitive' period as per the imprinting literature, and thus the imprint it created in firms' organisational memory and institutional logic, as well as the ensuing risk aversion of the managers and investors, resulted in a softer landing for these exposed firms during the Covid episode.

Thus, we propose that while companies exposed to the GFC shock were not necessarily superior in anticipating the Covid shock (Duchek, 2020), they were better at coping with its associated tremors such as its effects on their supply chain, workforce, and customers. It is also likely that such companies will adjust and adapt better once the Covid chapter is completely closed, which can be examined academically once the Covid turmoil is over. Therefore, we hypothesise that prior exposure to disastrous events, e.g., the GFC, results in firms learning from experience and thus receiving a softer blow when a new unforeseen but fundamentally similar event such as Covid hits them. Also, it is likely that such firms are in more demand by investors relative to their peers. Thus, we form the following testable hypotheses:

3. H_{1a}: Firms previously exposed to the GFC experience higher returns compared to their peers during the Covid crisis.

3.1. *H_{1b}: Firms previously exposed to the GFC have higher trading volumes compared to their peers during the Covid.*

We further look at the role of the senior management in this respect. When firms are faced with a disaster, the senior management, and the CEO in particular, are the key individuals dealing with the challenge of making difficult decisions often under time pressure. Prior research highlights the key role of managers in designing and implementing an organisational system that is capable of coping with organisational crises, i.e., "relatively low-probability, high-impact situations that threaten the competitiveness and viability of an organisation" (e.g., Balcaen and Ooghe, 2006; Carmeli and Schaubroeck, 2008). Thus, it is plausible to assume that when CEOs carry over any learned experience of prior exposure to disasters as part of their skillset and management toolbox into a new and similar crisis, this will help them to navigate their firms better through such challenging times Therefore, we form the following testable hypothesis:

[2] Of notable mention is the WHO Global Preparedness Monitoring Board report (2019), which warns, only three months before the outbreak of Covid, that the world is at imminent threat of a global pandemic with little or no precaution being undertaken.

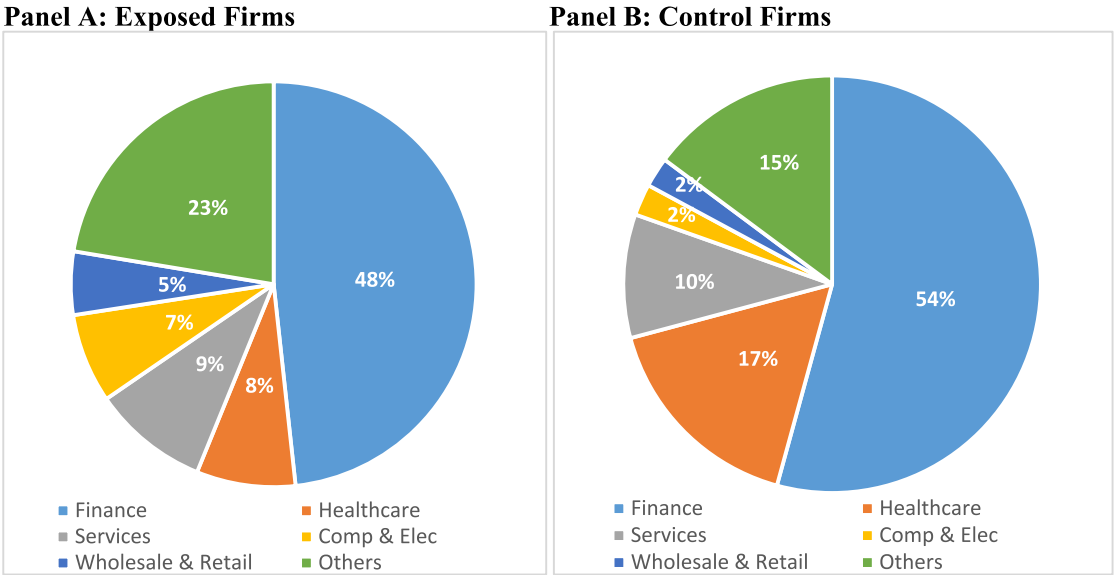

Fig. 1. Industry Distribution for Exposed and Control Firms. This figure shows the distribution of exposed and control firms according to their industry classification. Industry aggregation is based on the four-digit SIC codes. The 30 industry classification codes are used to construct the industries. They are obtained from Kenneth French's website. The period is based on Covid outbreak in the US from March 2020 to November 2020. While Panel A provides the distribution for 3269 *Exposed Firms*, Panel B is for 3112 *Control Firms*.

4. H_2: The CEOs with prior exposure to the GFC learn from this experience and bring added value to their firms during the Covid crisis.

Finally, we argue that the skills learned by firms and their leaders, when exposed to a crisis, are most helpful in dire crisis-specific situations, and not at all times. In other words, the associated learning only 'kicks in' when the firm is in 'crisis mode' and under considerable pressure. Moreover, such learned skills could also be germane for certain industry sectors that had a more intense exposure to the Covid crisis, such as firms in shutdown industries including travel and tourism. Thus, we formulate the following hypothesis:

H_3: Learning from exposure to past crises pays off only during similarly difficult situations and more so for intense conditions such as shutdown sectors during Covid.

5. Data and methodology

Our sample focuses on active US stocks traded in NYSE, NYSE Amex, NYSE Arca and NASDAQ. We identify 3320 firms that are traded in these markets throughout the 2008–2009 financial crisis.[3] Among those, 51 were not trading any more on stock markets as of March 2020, which we mark as the beginning of Covid pandemic in the US. Again, as of March 2020, there were 3112 other firms trading on the markets that were not exposed to the GFC – which make our control group. Overall, 51% of firms in our sample are exposed to the GFC and 49% are control firms. Considering all firms, 44% are traded in NASDAQ, 30% in NYSE, 23% in NYSE Arca, and the remaining 3% in NYSE Amex.

Fig. 1 provides the breakdown of firms exposed to the GFC as well as control firms by four-digit SIC industries. Both groups have a similar distribution of firms across industries. The majority of exposed and control firms are in the finance sector (48% and 54%, respectively). Other large sectors in both samples include healthcare, services, computer and electronics, as well as wholesale & retail.

The final sample includes 78,313 monthly firm observations from November 2019 to November 2020. We rely on the data on official Covid deaths in the US to determine our Covid "post periods". As Fig. A.1 in the Appendix reports, there are two fundamental periods in 2020, i.e., the onset of Covid crisis (March to April) and the (first) peak of the pandemic (March to November) with highest death tolls. Hence, we define *Post* as a dummy variable that is equal to one from March 2020 to November 2020, and zero from November 2019 to February 2020. In alternative analysis on the onset of the pandemic, we define *Post* to have the value of one from March 2020 to April 2020[4].

Table A.1 in the Appendix provides the definition of variables used in the study. We collect monthly data on stock prices, traded

[3] Fig. A.1 in the Appendix shows the similarities between the GFC and Covid regarding market reactions with sharp declines in stock prices.

[4] We have 35,522 monthly firm observations for the "onset" period ending in April 2020. That is<78,313 observations for "peak" period ending in November 2020 because the former is shorter than the latter period.

Table 1
Descriptive Statistics of Key Variables**.** This table presents mean, standard deviation, 25th percentile (P25), median, and 75th percentile (P75) values of exposed and control firms in the sample. While Panel A provides the statistics for 3269 *Exposed Firms*, Panel B gives the values for 3112 *Control Firms*. The period is between November 2019 and November 2020. *Market Value* is monthly closing price multiplied by common shares outstanding, in billions USD. *Return* is the monthly stock return in percentage. *Traded Volume* is the number of shares traded monthly for a stock in millions. *Dollar Volume* is the number of shares traded multiplied by the monthly closing price, in billions USD. *Signed Volume* is the number of shares traded multiplied by the monthly stock return, in ten millions.

Panel A: Exposed Firms					
	Mean	Standard Deviation	P25	Median	P75
Market Value (in $bn)	6.687	17.532	0.153	0.684	3.567
Return (%)	1.464	16.334	−5.862	0.724	7.121
Traded Volume (in millions)	27.456	63.938	1.067	5.285	21.533
Dollar Volume (in $bn)	1.291	3.259	0.014	0.111	0.788
Signed Volume (in 10 millions)	0.066	0.919	−0.021	0.000	0.039
Panel B: Control Firms					
	Mean	**Standard Deviation**	**P25**	**Median**	**P75**
Market Value (in $bn)	1.644	6.484	0.045	0.201	0.900
Return (%)	2.307	18.347	−5.160	0.878	7.565
Traded Volume (in millions)	16.315	45.827	0.338	2.479	11.347
Dollar Volume (in $bn)	0.466	1.801	0.006	0.031	0.192
Signed Volume (in 10 millions)	0.077	0.867	−0.008	0.000	0.018

Table 2
Difference-in-Difference Analysis on Returns. This table presents estimates for *Exposed* × *Post* along with *Market Value*, *Mktrf, SMB, HML, RMW,* and *CMA* as control variables. *Return* and *Excess Return* are the dependent variables. *Exposed* is the dummy variable for the firms with stocks traded in NYSE, NYSE American, and NASDAQ throughout 2008 – 2009 subprime mortgage crisis and during the Covid period; and zero for the firms with stocks traded only after 2008 – 2009 crisis and during the Covid period. *Post* is the monthly dummy variable that is equal to one from March 2020 to November 2020 (April 2020 for the onset); and zero from November 2019 to February 2020. *Return* is the monthly stock return in percentage. *Excess Return* is the monthly stock return in excess of the risk-free rate that is proxied by the one-month T-Bill rate. Variable definitions are given in Table A.1 in Appendix. Time and firm fixed effects are included. Standard errors are clustered by firms and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Covid Crisis:	Onset		Peak	
	Return (%)	Excess Return (%)	Return (%)	Excess Return (%)
	I	**II**	**III**	**IV**
Exposed × Post	0.949***	0.993***	0.564***	0.619***
	(0.329)	(0.333)	(0.218)	(0.224)
Market Value	0.618***	0.616***	0.338***	0.339***
	(0.071)	(0.072)	(0.041)	(0.042)
Mktrf	0.815***	0.978***	0.972***	0.873***
	(0.019)	(0.020)	(0.015)	(0.015)
SMB	−0.139**	1.153***	0.401***	1.103***
	(0.067)	(0.069)	(0.052)	(0.053)
HML	0.625***	−0.613***	0.217***	0.621***
	(0.057)	(0.058)	(0.038)	(0.038)
RMW	0.849***	2.848***	−0.282***	1.998***
	(0.117)	(0.119)	(0.061)	(0.063)
CMA	−0.913***	−1.225***	0.265**	3.926***
	(0.071)	(0.073)	(0.110)	(0.112)
Constant	−1.687***	−14.670***	−2.488***	−5.426***
	(0.359)	(0.368)	(0.246)	(0.250)
Firm Fixed Effect	YES	YES	YES	YES
Time Fixed Effect	YES	YES	YES	YES
Observation	35,402	35,402	77,845	77,845
Adj. R^2	0.358	0.485	0.263	0.429

volume, and dollar volume from CRSP. Excess return is the monthly return in excess of the risk-free rate, i.e.one-month T-Bill rate. As an indicator of the strength of the price move and confirmation of the change in value, we measure trading volume through three different variables. The monthly average traded volume of stocks and dollar volume in US dollars are proxies for the aggregate fund flows into the market. A signed version of traded volume is calculated as the product of the monthly average traded volume and realized monthly returns. This measure explains the direction of trading activity. It takes a positive (negative) value if there is buy (sell) pressure in the market (see, e.g., Campbell et al., 1993; Llorente et al., 2002; Tosun, 2021). In all models, we control for firm size by

Table 3
Difference-in-Difference Analysis on Trading Activity. This table presents estimates for *Exposed* × *Post* along with *Market Value*, *SMB, HML, RMW,* and *CMA* as control variables. *Traded Volume, Dollar Volume,* and *Signed Volume* are the dependent variables. *Exposed* is the dummy variable for the firms with stocks traded in NYSE, NYSE American, and NASDAQ throughout 2008 – 2009 subprime mortgage crisis and during the Covid period; and zero for the firms with stocks traded only after 2008 – 2009 crisis and during the Covid period. *Post* is the monthly dummy variable that is equal to one from March 2020 to November 2020 (April 2020 for the onset); and zero from November 2019 to February 2020. *Traded Volume* is the number of shares traded monthly, in millions. *Dollar Volume* is the number of shares traded multiplied by the monthly closing price, in billions USD. *Signed Volume* is the number of shares traded multiplied by the monthly stock return, in ten millions. Variable definitions are given in Table A.1 in Appendix. Time and firm fixed effects are included. Standard errors are clustered by firms and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Covid Crisis:	Onset			Peak		
	Traded Volume	Dollar Volume	Signed Volume	Traded Volume	Dollar Volume	Signed Volume
	I	**II**	**III**	**IV**	**V**	**VI**
Exposed × Post	5.866***	0.332***	0.052***	1.757***	0.107***	0.042***
	(0.965)	(0.033)	(0.017)	(0.677)	(0.020)	(0.012)
Market Value	−1.709**	−0.019	0.070***	−0.408	0.080***	0.042***
	(0.802)	(0.031)	(0.011)	(0.298)	(0.011)	(0.005)
Mktrf	−0.246***	−0.007***	0.014***	−0.344***	−0.009***	0.023***
	(0.028)	(0.001)	(0.001)	(0.024)	(0.001)	(0.001)
SMB	0.499***	−0.001	0.002	0.744***	0.028***	−0.001
	(0.090)	(0.003)	(0.002)	(0.076)	(0.002)	(0.002)
HML	−1.032***	−0.012***	0.013***	−0.697***	−0.030***	0.013***
	(0.098)	(0.003)	(0.002)	(0.050)	(0.001)	(0.002)
RMW	2.109***	0.045***	0.055***	1.322***	0.021***	−0.009***
	(0.168)	(0.005)	(0.005)	(0.127)	(0.003)	(0.002)
CMA	0.559***	0.001	−0.039***	3.789***	0.098***	0.011**
	(0.090)	(0.002)	(0.003)	(0.232)	(0.007)	(0.004)
Constant	25.64***	0.893***	−0.254***	23.25***	0.472***	−0.199***
	(3.614)	(0.142)	(0.0505)	(1.361)	(0.046)	(0.024)
Firm FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
Observation	35,522	35,522	35,381	78,313	78,313	77,800
Adj. R^2	0.110	0.071	0.122	0.043	0.070	0.073

market value in billions of USD. From the Kenneth R. French online library,[5] we also use aggregate risk factors, i.e., market risk, size, value, investment opportunities, and profitability (see, e.g., Fama and French, 2015) in our models. Controlling for momentum following Carhart (1997) gives virtually similar results in untabulated analysis. All variables are winsorized at the 1st and 99th percentiles against the influence of outliers.

Table 1 gives the summary statistics for key variables. On average, exposed firms' market capitalisations are larger ($6.7 billion) than control firms ($1.6 billion). The right-skewed distribution of *Market Value* indicates that there are a few very large firms among both exposed and control firms. The highly right-skewed distributions of *Traded* and *Dollar Volume* imply that the shares of certain firms are traded more than others. There is a buy pressure in the market, suggested by positive values for *Signed Volume*.[6]

To test our core hypothesis of learning through exposure to prior disasters, e.g., the GFC, we conduct a difference-in-difference (DID) analysis. It is worth noting that Covid was a predominantly unanticipated shock considering its immediate and sharp impact as validated by the fast rise in deaths, see Fig. A2. Therefore, we believe our analysis is safe from endogeneity of this shock. The model is specified as follows:

$$Marketactivity_{i,t} = \alpha + \beta Exposed \times Post_t + \gamma controls_{i,t} + \delta_i + \mu_t + \varepsilon_{i,t} \quad (1)$$

where $Marketactivity_{i,t}$ denotes *Return, Excess Return, Traded Volume, Dollar Volume, Signed Volume* for firm *i* in month *t; Exposed*$_i$ is for firms that survived GFC of 2008 as described before; $Post_t$ is a monthly dummy variable that is equal to one from March 2020 to November 2020 (or April 2020 for the onset of the pandemic) and zero otherwise; $controls_{i,t}$ is control variables, i.e. *Market Value*, *Mktrf, SMB, HML, RMW,* and *CMA;* δ_i and μ_t are firm and time fixed effects, respectively. Since *Exposed* and *Post* are time- and firm-invariant dummy variables, respectively, firm and time fixed effects subsumes those individual *Exposed* and *Post* dummies in the model. Standard errors are clustered at the firm level.

6. Main results

Table 2 reports DID estimates regarding the stock returns and excess returns for the onset and peak of the pandemic. The coefficients for *Exposed* × *Post* are positive and statistically significant at 1% level, and control variables are significant with expected

[5] https://mba.tuck.dartmouth.edu/pages/faculty/Ken.French/data library.html.

[6] Considering *Return* and *Signed Volume*, we address the possibility of mean reversion through the analyses in Section 4. Particularly, the results from placebo analyses reveal no statistical difference between control and exposed firms neither in pre- nor post-period when we examine the relation one year prior the Covid shock. Hence, we conclude that mean reversion of returns should not be an issue for our study.

Table 4

Analysis on Corporate and CEO Learning. This table presents estimates for *Exposed* × *Post.* Original control variables and an intercept are included in the model, but not reported in this table. Panel A gives the results with exposed firms having the same CEOs in the GFC and Covid period while Panel B presents the findings with the exposed firms having their CEOs replaced since the GFC. *Return*, *Excess Return*, *Traded Volume, Dollar Volume,* and *Signed Volume* are the dependent variables. Panel C provides results on measures of corporate investment as dependent variable: *(Capex + RD)/TA* is the sum of capital expenditures and R&D investments over total assets; *RD/TA* is R&D investments over total assets; *Capex/TA* is capital expenditures over total assets. Variable definitions are given in Table A.1 in Appendix. Time and firm fixed effects are included. Standard errors are clustered by firms and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Covid Crisis:	Onset					Peak				
Panel A: Analysis with Learned CEOs										
	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume
	I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
Exposed × Post	2.847***	2.948***	5.351***	0.343***	0.075**	1.763***	1.841***	2.749**	0.169***	0.074***
	(0.680)	(0.684)	(1.981)	(0.075)	(0.037)	(0.400)	(0.402)	(1.167)	(0.055)	(0.024)
Controls, FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observation	17,714	17,714	17,839	17,839	17,699	39,576	39,576	40,049	40,049	39,539
Adj. R^2	0.351	0.471	0.087	0.041	0.106	0.257	0.412	0.025	0.128	0.064
Panel B: Analysis with New CEOs										
	Return (%)	**Excess Return (%)**	**Traded Volume**	**Dollar Volume**	**Signed Volume**	**Return (%)**	**Excess Return (%)**	**Traded Volume**	**Dollar Volume**	**Signed Volume**
Exposed × Post	0.803**	0.840**	5.895***	0.335***	0.053***	0.451**	0.504**	1.840***	0.105***	0.039***
	(0.337)	(0.340)	(0.998)	(0.034)	(0.018)	(0.225)	(0.230)	(0.705)	(0.021)	(0.013)
Controls, FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observation	33,398	33,398	33,518	33,518	33,377	73,503	73,503	73,970	73,970	73,458
Adj. R^2	0.353	0.479	0.103	0.069	0.117	0.259	0.425	0.041	0.074	0.070
Panel C: Analysis on Corporate Learning										
	(Capex + RD)/TA		**RD/TA**	**Capex/TA**		**(Capex + RD)/TA**		**RD/TA**	**Capex/TA**	
Exposed × Post	0.142***		0.143***	0.006		0.352***		0.342***	0.026***	
	(0.041)		(0.037)	(0.009)		(0.067)		(0.062)	(0.009)	
Controls, FEs	YES		YES	YES		YES		YES	YES	
Observation	14,685		14,781	14,685		47,975		48,548	47,975	
Adj. R^2	0.020		0.014	0.024		0.026		0.015	0.033	

signs. Particularly, companies exposed to GFC and survived have learned from such a disastrous experience as they earn 95% (99%) more than their peers in stock returns (excess returns) in the onset of Covid crisis. These firms do 56% (62%) better in stock returns (excess returns) even during the peak of the pandemic. Overall, these findings suggest organisational learning in firms exposed to GFC where they apply their learned survival skills during the next crisis, i.e., Covid, and experience higher market value than their peers. These results support the H_{1a} hypothesis.

Next, we examine trading volume in Table 3. Specifically, positive estimates for *Exposed* × *Post* regarding trading volume, dollar volume and signed volume are statistically significant at 1% level for both the onset and the peak of Covid crisis. They indicate a strong price move and confirm the value increase in those resilient firms. Companies that survived the financial crisis of 2008 have learned how to manage such crisis as their shares are traded 5.9 (1.8) times more than their peers in the onset (peak) of the pandemic. Results for *Dollar Volume* also support this claim in USD terms. In the onset of the pandemic, the generated value through trading exposed firms is 33% higher compared to their counterparts. Even in the peak of Covid, trading these companies' stocks generates 11% more value in USD terms. The positive coefficients for *Signed Volume* in Columns III and VI confirm the market value increase for firms that 'learned' financial survival through buy pressure. Overall, these findings support the H_{1a} and H_{1b} hypotheses and suggest that exposed firms carry a more vivid 'imprint' (Marquis and Tilcsik, 2013) in their organisational memory.[7]

Next, we focus on the role of the CEOs. If learning to survive is key to increased market value, an interesting question is whether the current CEO was exposed to the GFC. Can any associated CEO learning and experience (e.g., Bernile, Bhagwat, and Rau, 2017) bring added value to those firms during the Covid crisis? Is the learning primarily concentrated in CEOs or does the whole organisation learn from exposure to prior disasters? To investigate these questions, we consider three different angles. *First*, we study whether

[7] In untabulated analyses, we follow McTier et al. (2013) and construct the monthly change in natural logarithm of the traded volume and the dollar volume as dependent variables. Further, we consider other timelines for post periods: start of 1st and 3rd Covid-waves, the middle of 2nd wave, and the end of 3rd wave, i.e., March 2020, October 2020, July 2020, and January 2021, respectively. Moreover, the stocks in our sample are traded in four different exchanges. Hence, we also repeat the main analyses for each individual exchange, separately. Additionally, we exclude firms with headquarters in Delaware due the state's special consideration. We also drop financial firms to avoid any bias in findings as they make up about half of our sample. The main conclusion remains robust to all these tests.

Table 5

Placebo Tests on Returns and Trading Activity. This table presents estimates for *Exposed* × *Post* along with control variables. *Return*, *Excess Return*, *Traded Volume, Dollar Volume,* and *Signed Volume* are the dependent variables. For this analysis, the main model is kept the same, but the timeline is shifted 12-months backwards. *Post* is the monthly dummy variable that is equal to one from March 2019 to November 2019 (April 2019 for the onset); and zero from November 2018 to February 2019. *Exposed* is the dummy variable for the firms with stocks traded in NYSE, NYSE American, and NASDAQ throughout 2008 – 2009 subprime mortgage crisis and during the Covid period; and zero for the firms with stocks traded only after 2008 – 2009 crisis and also during the Covid period. Variable definitions are given in Table A.1 in Appendix. Time and firm fixed effects are included. Standard errors are clustered by firms and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Panel A: Post Period – (March - April 2019)

	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume
	I	**II**	**III**	**IV**	**V**
Exposed × Post	−0.023	0.056	0.522	−0.085	0.104
	(0.134)	(0.242)	(0.532)	(0.137)	(0.168)
Control Variables	YES	YES	YES	YES	YES
Firm and Time FE	YES	YES	YES	YES	YES
Observation	35,402	35,402	35,522	35,522	35,381
Adj. R^2	0.267	0.526	0.029	0.052	0.042
Panel B: Post Period – (March - November 2019)					
	Return (%)	**Excess Return (%)**	**Traded Volume**	**Dollar Volume**	**Signed Volume**
	I	**II**	**III**	**IV**	**V**
Exposed × Post	0.103	0.155	−0.028	−0.155	−0.004
	(0.073)	(0.136)	(0.451)	(0.106)	(0.005)
Control Variables	YES	YES	YES	YES	YES
Firm and Time FE	YES	YES	YES	YES	YES
Observation	77,845	77,845	78,313	78,313	77,800
Adj. R^2	0.196	0.429	0.030	0.111	0.035

organisational learning is led by exposed CEOs. The CEO of exposed firms might have learned through experiencing the GFC. If this were the case, we would expect firms with CEOs that learned from GFC should do better than firms who survived GFC but have a different (unexposed) CEO during Covid. *Second*, we study whether there is organisational learning that precipitates within the firm beyond the experience of the CEO. We investigate firms with new CEOs to understand if they still perform better during the Covid crisis compared to their peers who did not experience the GFC. *Third*, our study discusses what lessons firms learn from previous crises by comparing operational strategies and corporate investments.

We first identify GFC-exposed firms with the same CEO still in role during Covid (335 firms) and with a different CEO (2934 firms) and repeat our main analysis with these two sets of exposed firms separately. Table 4 gives the results in Panels A and B. Exposed firms with exposed CEOs have higher (excess) stock returns and trading activity not only compared to their counterparts both in the onset and the peak of the pandemic but also compared to other exposed firms with new CEOs. For instance, GFC-exposed firms with the same CEO do about 2.8 (1.7) times better than their peers with no GFC experience in stock returns in the onset (the peak) of Covid crisis while it is 80% (45%) better stock return for GFC-exposed companies with a new CEO compared to other firms with no GFC exposure. These findings reveal fascinating evidence supporting our hypothesis. They suggest that organisational learning goes beyond the mere experience of the CEO as in Panel B exposed firms with new CEOs still outperform their unexposed peers during Covid. Furthermore, comparing Panel A to Panel B implies that exposed CEOs add more value to their firms compared to similar resilient firms with new unexposed CEOs. The results regarding *Traded Volume, Dollar Volume,* and *Signed Volume* resonate our conclusion on value increase and indicate strong price movement. Overall, hypothesis H_2 is supported.

Panel C of Table 4 reports results on the learning process from previous crisis. We examine corporate learning through corporate investments processes (Chen et al., 2007). Particularly, resilient firms with learned survival skills increase their investments including capital expenditures and R&D by 14% more than their peers in the onset of Covid turmoil. Those firms invest 35% more than the counterparts without GFC experience when conditions are the worst during the peak of the pandemic. These results suggest organisational learning of survival skills can be in the form of corporate investments and innovation. These interesting findings give further support to H_1 hypothesis that corporate learning from GFC is associated with higher stock returns, and thus market value.

Are our main results driven by the "default resilience" of GFC-exposed companies? In other words, should they still perform better than their peers in "normal times" where they cannot benefit from their prior GFC experience? To examine this question, we conduct a placebo test where we keep our main model in Equation (1) the same but shift the timeline 12 months backwards where the post period covers "normal times". Statistically insignificant results in Table 5 suggest that exposed firms do not outperform their counterparts outside the Covid period, and their shares are not traded differently either. These findings imply GFC-exposed firms do not possess a default resilience that could lead our main results, and those firms develop skills needed for survival in crisis conditions through organisational learning. This is not unlike the resilience that firms pick up in the face of challenges and hardships experienced by their top management (Nguyen, Hagendorff and Eshraghi, 2018).

We further examine whether these crisis-specific learned skills for survival pay off more when the business conditions are the most severe during the pandemic. Thus, we compare the shutdown industries to the other sectors that were allowed to operate during Covid. If our conjecture were correct, then exposed companies with learned survival skills should do better given they were shut down in the peak of the pandemic. Following state regulation, the shutdown industries include Recreation, Entertainment, Textile, Construction,

Table 6

Analysis of Shutdown and Running Industries during the Covid Period. This table presents estimates for *Exposed* × *Post* for shutdown (Panel A) and running (Panel B) industries during the Covid Pandemic, separately. Shutdown industries include Recreation, Entertainment, Textile, Construction, Manufacturing, Service, Restaurants and Hotels, and Others; while running industries are Finance, Healthcare, Consumer Goods, Communication, and Utilities. Original control variables are also included in the model. An intercept is included in the model but is not reported in this table. *Return*, *Excess Return*, *Traded Volume, Dollar Volume,* and *Signed Volume* are the dependent variables. *Exposed* is the dummy variable for the firms with stocks traded in NYSE, NYSE American, and NASDAQ throughout 2008 – 2009 subprime mortgage crisis and during the Covid period; and zero for the firms with stocks traded only after 2008 – 2009 crisis and also during the Covid period. *Post* is the monthly dummy variable that is equal to one from March 2020 to November 2020 (April 2020 for the onset); and zero from November 2019 to February 2020. Variable definitions are given in Table A.1 in Appendix. Time and firm fixed effects are included. Standard errors are clustered by firms and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Panel A: Shutdown Industries during the Covid Pandemic

Covid Crisis:	Onset					Peak				
	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume
	I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
Exposed × Post	1.485*	1.544*	−1.748	0.026	0.059*	1.775***	9.673***	4.633***	0.141***	0.031
	(0.886)	(0.889)	(2.331)	(0.065)	(0.033)	(0.486)	(0.510)	(1.437)	(0.041)	(0.024)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observation	5,363	5,363	5,381	5,381	5,353	11,924	11,924	12,065	12,065	11,898
Adj. R^2	0.419	0.529	0.110	0.135	0.230	0.292	0.411	0.036	0.116	0.108
Panel B: Running Industries during the Covid Pandemic										
Covid Crisis:	**Onset**					**Peak**				
	Return (%)	**Excess Return (%)**	**Traded Volume**	**Dollar Volume**	**Signed Volume**	**Return (%)**	**Excess Return (%)**	**Traded Volume**	**Dollar Volume**	**Signed Volume**
Exposed × Post	0.882**	0.942***	7.358***	0.377***	0.049***	0.497**	0.556**	2.637***	0.148***	0.058***
	(0.351)	(0.351)	(1.005)	(0.034)	(0.016)	(0.232)	(0.238)	(0.706)	(0.020)	(0.012)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observation	30,039	30,039	30,141	30,141	30,028	65,921	65,921	66,248	66,248	65,902
Adj. R^2	0.350	0.484	0.108	0.071	0.125	0.260	0.432	0.045	0.060	0.067

Manufacturing, Service, Restaurants and Hotels, and Others while running industries are Finance, Healthcare, Consumer Goods, Communication, and Utilities. We repeat the main analysis for each group.[8]

The results in Table 6 indicate that exposed firms in shutdown industries have 1.8 times higher stock returns than their peers in the peak of Covid while they also do better during the peak compared to the onset of Covid crisis (1.5 times). Furthermore, those firms with learned crisis-specific skills in shutdown sectors also have higher stock returns than similar exposed companies in running industries (50%) during the peak of the pandemic. When conditions are the most damaging for businesses, the value of organisational learning on survival is the highest as those firms can implement what they have learned in such most difficult times. Our results on trading activity provide also similar interpretation. Particularly, the shares of exposed firms in shutdown sectors during the peak time trade 4.6 times more than their counterparts' stocks while it is 2.6 times for similar GFC-exposed companies in running industries. Organisational learning on survival proves more valuable to those firms in most severe conditions during Covid. Overall, these findings support our H_3 hypothesis.

7. Further analysis

7.1. Analysis concerning firm size and age

In this sub-section, we refine the original sample through propensity score matching to address concerns around firm size as exposed firms are, on average, larger than control firms[9]. Particularly, each exposed firm is matched to the closest control firm (maximum two control firms) regarding the natural logarithm of their market value and Fama-French 30 industry classification codes. Unmatched exposed and control firms are dropped from the sample. Some exposed firms are matched to the same control firms. The

[8] Certain sectors were affected arguably more than others by the pandemic. Service, hospitality, and travel businesses suffered considerably due to state and government restrictions. Hospitals and healthcare sector was under immense pressure to treat patients contracted the Covid virus. Wholesale and retail shops were ordered to shut down unless they were classified as "essential". Our conclusion does not change after examining these sectors individually.

[9] Additionally, we control for firm size in all analyses through *Market Value*.

Table 7

Analysis Concerning Firm Size and Firm Age. This table presents estimates for *Exposed* × *Post* along with *Ln(Firm Age)* as an additional control variable. *Return*, *Excess Return*, *Traded Volume, Dollar Volume,* and *Signed Volume* are the dependent variables. Original control variables are also included in the model. The original sample is refined through the "propensity score matching" method to address concerns around firm size. Particularly, each exposed firm is matched to the closest control firm (maximum two control firms) regarding the natural logarithm of their market value and Fama French 30 industry classification codes. Unmatched exposed and control firms are dropped from the sample. Some exposed firms are matched to the same control firms. The refined sample includes 3,215 exposed and 2,659 control firms. After this process, the main analysis are replicated by controlling for firm age explicitly, and the results are reported in this table. Variable definitions are given in Table A.1 in Appendix. Time and firm fixed effects are included. Standard errors are clustered by firms and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Panel A: Covid Crisis – Onset					
	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume
	I	**II**	**III**	**IV**	**V**
Exposed × Post	0.660**	0.660**	6.665***	0.383***	0.070***
	(0.330)	(0.332)	(0.846)	(0.028)	(0.017)
Ln(Firm Age)	−1.323***	−1.320***	6.905***	0.064***	−0.072***
	(0.135)	(0.138)	(0.886)	(0.021)	(0.007)
Control Variables	YES	YES	YES	YES	YES
Firm and Time FE	YES	YES	YES	YES	YES
Observation	22,874	22,874	22,928	22,928	22,870
Adj. R^2	0.378	0.528	0.229	0.067	0.113
Panel B: Covid Crisis – Peak					
	Return (%)	**Excess Return (%)**	**Traded Volume**	**Dollar Volume**	**Signed Volume**
	I	**II**	**III**	**IV**	**V**
Exposed × Post	0.630***	0.681***	2.285***	0.060***	0.064***
	(0.245)	(0.260)	(0.717)	(0.021)	(0.015)
Ln(Firm Age)	1.268	1.207	6.526***	−0.698***	0.370***
	(1.502)	(1.548)	(0.877)	(0.094)	(0.072)
Control Variables	YES	YES	YES	YES	YES
Firm and Time FE	YES	YES	YES	YES	YES
Observation	74,077	74,077	74,167	74,167	74,061
Adj. R^2	0.269	0.437	0.227	0.070	0.074

refined sample includes 3,215 exposed and 2,659 control firms. After this process, the main analysis are replicated by controlling for firm age explicitly, and the results are reported in Table 7.[10] Statistically significant and positive coefficients for *Exposed* × *Post* suggest that neither firm size nor age are the factors driving our original findings. Firms with learned survival skills still do better by 66% (63%) in the onset (peak) of Covid crisis in stock returns compared to their peers of similar size while their shares are again traded significantly more than their counterparts', i.e., 6.67 and 2.29 times in the onset and peak of the pandemic, respectively. Discounting the potential impact of firm age in Columns III to V, the results on trading activity indicate the strength of the price movement and confirm the value increase by volume through buy pressure.

7.2. Fundamental firm characteristics

Foerster et al. (2017) argue that cash flow from operations and capital expenditures have strong predictive power for stock returns. Trigeorgis and Lambertides (2014) examine growth options in relation to stock returns and show that capital investments are negatively associated with stock returns. Wang et al. (2009) consider further determinants of stock returns. Focusing on stock market crashes, they show a significant relationship between stock returns and firm debt ratio, market-to-book ratio, firm size, and cash flow. Relying on these studies, we control for possible effects of fundamental firm characteristics through the following variables: *M/B* is the common shares outstanding multiplied by the closing price over total assets by the end of quarter; *OProfit* is cash flow from operations over total assets by the end of quarter; *Leverage* is the sum of short-term and long-term debt over total assets by the end of quarter; *Capex/TA* is capital expenditures over total assets by the end of quarter. We obtain robust results in Table 8[11]. Particularly, firm fundamentals (except leverage) are associated with stock returns and trading volume significantly, confirming the importance of this exercise. After controlling for this relation, we have findings on trading activity significant and similar to our original results while they are stronger considering stock (excess) returns in both the onset and the peak of Covid crisis.

7.3. Macro-Economic factors

Although we include time fixed effects in all analysis that control for underlying observable and unobservable systematic differences between months, we need to control further for macro-economic factors as different firms may have varying exposures to such

[10] In untabulated analysis, we also interact firm age with our explanatory variable and find that our findings are not driven by firm age.

[11] Please note that the number of observations is less than the one in our main analyses because quarterly data are used due to availability to construct these new control variables instead of monthly data.

Table 8

Fundamental Firm Characteristics. This table presents estimates for *Exposed* × *Post* along with *M/B, OProfit, Leverage,* and *Capex/TA* as additional control variables. Original control variables are also included in the model. An intercept is included in the model but is not reported in this table. *Return*, *Excess Return*, *Traded Volume, Dollar Volume,* and *Signed Volume* are the dependent variables. Fundamental firm characteristics are controlled through the following variables: *M/B* is the common shares outstanding multiplied by the closing price over total assets by the end of quarter; *OProfit* is cash flow from operations over total assets by the end of quarter; *Leverage* is the sum of short-term and long-term debt over total assets by the end of quarter; *Capex/TA* is capital expenditures over total assets by the end of quarter. Variable definitions are given in Table A.1 in Appendix. Time and firm fixed effects are included. Standard errors are clustered by firms and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Covid Crisis:	Onset					Peak				
	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume
	I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
Exposed × Post	1.931***	1.954***	2.654**	0.251***	0.147***	1.598***	1.740***	1.456*	0.091***	0.042**
	(0.679)	(0.690)	(1.281)	(0.038)	(0.034)	(0.391)	(0.401)	(0.844)	(0.025)	(0.020)
M/B	2.851***	2.797***	1.358*	0.047***	0.083***	2.464***	2.476***	2.614***	0.108***	0.095***
	(0.437)	(0.437)	(0.732)	(0.014)	(0.027)	(0.159)	(0.160)	(0.480)	(0.016)	(0.010)
OProfit	0.197**	0.193**	−0.058	0.001	−0.009**	0.116***	0.116***	0.139*	0.002*	0.002*
	(0.083)	(0.082)	(0.081)	(0.002)	(0.004)	(0.032)	(0.033)	(0.074)	(0.001)	(0.001)
Leverage	7.915	8.099	−14.090	−0.065	−0.447	2.996	3.086	–23.710***	−0.282*	0.030
	(8.463)	(8.530)	(17.591)	(0.167)	(0.626)	(1.995)	(2.002)	(7.561)	(0.153)	(0.120)
Capex/TA	−4.303***	−4.211***	−6.533***	−0.109***	−0.395***	−1.202***	−1.200***	−1.847**	−0.068***	−0.074***
	(0.999)	(0.989)	(1.394)	(0.039)	(0.072)	(0.267)	(0.269)	(0.820)	(0.020)	(0.016)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observation	13,097	13,097	13,119	13,119	13,089	43,583	43,583	43,726	43,726	43,561
Adj. R^2	0.447	0.576	0.141	0.077	0.185	0.269	0.403	0.051	0.095	0.097

Table 9

Macro-Economic Factors. This table presents estimates for *Exposed* × *Post* along with *Unemployment* and *PPI* as additional control variables. *Return, Excess Return, Traded Volume, Dollar Volume,* and *Signed Volume* are the dependent variables. Original control variables are also included in the model. An intercept is included in the model but is not reported in this table. Macro-economic factors are controlled through the following variables: *Unemployment* is the growth in monthly unemployment rate; *PPI* is the growth in monthly product price index to reflect inflation. Variable definitions are given in Table A.1 in Appendix. Firm fixed effects are included. Standard errors are clustered by firms and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Panel A: Covid Crisis – Onset										
	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume
	I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
Exposed × Post	0.949***	0.993***	5.866***	0.332***	0.052***	0.947***	0.990***	5.801***	0.328***	0.050***
	(0.329)	(0.333)	(0.965)	(0.033)	(0.017)	(0.322)	(0.330)	(0.960)	(0.032)	(0.016)
Unemployment	1.851***	6.213***	4.600***	0.097***	0.121***					
	(0.255)	(0.260)	(0.366)	(0.011)	(0.011)					
PPI						−4.256***	−14.28***	−10.57***	−0.223***	−0.278***
						(0.586)	(0.599)	(0.841)	(0.025)	(0.026)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observation	35,402	35,402	35,522	35,522	35,381	35,402	35,402	35,522	35,522	35,381
Adj. R^2	0.358	0.485	0.110	0.071	0.122	0.359	0.486	0.111	0.070	0.120
Panel B: Covid Crisis – Peak										
	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume
Exposed × Post	0.391***	8.815***	5.483***	0.177***	0.034***	0.338**	7.981***	5.318***	0.180***	0.040***
	(0.151)	(0.158)	(0.497)	(0.015)	(0.008)	(0.159)	(0.166)	(0.510)	(0.015)	(0.009)
Unemployment	0.386***	−0.342***	0.931***	0.047***	0.039***					
	(0.105)	(0.105)	(0.180)	(0.005)	(0.005)					
PPI						−0.039	2.204***	0.002	−0.028***	−0.030***
						(0.128)	(0.130)	(0.228)	(0.006)	(0.006)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observation	77,845	77,845	78,313	78,313	77,800	77,845	77,845	78,313	78,313	77,800
Adj. R^2	0.260	0.400	0.038	0.067	0.070	0.260	0.403	0.037	0.066	0.070

Table 10

State and Government Intervention. This table presents estimates for *Exposed* × *Post* along with *GovResIndex* as additional control variable. *Return*, *Excess Return*, *Traded Volume, Dollar Volume,* and *Signed Volume* are the dependent variables. Original control variables are also included in the model. An intercept is included in the model but is not reported in this table. State and government intervention during Covid pandemic are controlled with the following variable relying on Covid Government Response Tracker by University of Oxford: *GovResIndex* records how the response of governments has varied over all indicators in the database, becoming stronger or weaker over the course of the outbreak. These indices take values from 0 to 100. Variable definitions are given in Table A.1 in Appendix. Time and firm fixed effects are included. Standard errors are clustered by firms and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Panel A: Covid Crisis – Onset					
	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume
	I	**II**	**III**	**IV**	**V**
Exposed × Post	0.745**	0.788**	6.025***	0.342***	0.044**
	(0.332)	(0.336)	(0.976)	(0.033)	(0.017)
GovResIndex	−0.160***	−0.161***	0.063	0.005**	−0.010***
	(0.034)	(0.034)	(0.073)	(0.003)	(0.002)
Control Variables	YES	YES	YES	YES	YES
Firm and Time FE	YES	YES	YES	YES	YES
Observation	34,820	34,820	34,937	34,937	34,799
Adj. R^2	0.361	0.489	0.111	0.072	0.124
Panel B: Covid Crisis – Peak					
	Return (%)	**Excess Return (%)**	**Traded Volume**	**Dollar Volume**	**Signed Volume**
	I	**II**	**III**	**IV**	**V**
Exposed × Post	0.429**	0.481**	1.885***	0.110***	0.040***
	(0.217)	(0.224)	(0.686)	(0.021)	(0.012)
GovResIndex	−0.083***	−0.084***	0.055*	0.002**	−0.003***
	(0.012)	(0.013)	(0.032)	(0.001)	(0.001)
Control Variables	YES	YES	YES	YES	YES
Firm and Time FE	YES	YES	YES	YES	YES
Observation	76,584	76,584	77,045	77,045	76,539
Adj. R^2	0.266	0.434	0.045	0.069	0.074

variables. For example, labour intensive firms may be more sensitive to shocks in unemployment figures than their peers. Given we draw financial and economic similarities between the GFC and Covid crises in this paper, we control for the macro-economic factors explicitly, following Baghai et al. (2014) and Devos and Rahman (2018). We define *Unemployment* as the growth in monthly unemployment rate, and *PPI* as the growth in monthly product price index to reflect inflation. The results in Table 9 show that unemployment (PPI) is positively (negatively) associated with stock return and trading activity; hence, it is crucial we control for these factors. Considering the coefficients for *Exposed* × *Post,* our findings on returns and trading volume are robust to these macro-economic factors.[12] In terms of magnitude, they are similar to original results, and they imply companies exposed to the GFC and have learned how to survive financially manage to have higher returns and trading volume compared their peers throughout the pandemic.

7.4. State and government intervention

Covid pandemic has been handled differently by each state in the US. While some states had more restrictions, e.g., wearing face coverings, ban on indoor and large outdoor gatherings, school and day-care closures, closures on non-essential shops, bars, restaurants, venues, some other states followed a lighter approach. Additionally, the US federal government has also intervened particularly to provide economic support, e.g., paid sick-leave, furlough scheme.

We further incorporate these factors in our model and control for their potential effects on firm value. This ensures that the results for firms that learned from GFC is not contaminated by policy response to the crisis by different states. Following Zaremba et al. (2021) and Hale et al. (2020), we obtain the data from "Covid Government Response Tracker" by University of Oxford, and use four indices: *StringencyIndex* records the strictness of lockdown policies that primarily restrict people's behaviour; *ContHealthIndex* combines lockdown restrictions and closures with measures such as testing policy and contact tracing, short-term investment in healthcare, as well investments in vaccines; *EconSupportIndex* records measures such as income support and debt relief; *GovResIndex* records how the response of governments has varied over all indicators, becoming stronger or weaker in course of the outbreak. These indices range from 0 to 100.

Table 10 provides the results with *GovResIndex*.[13] They indicate that involvement by the government has a significant relation to market reaction regarding returns and trading activity throughout the pandemic. More importantly, even after controlling for such intervention's effect on stock markets, firms that learned from the GFC of 2008 have higher (excess) returns than their peers by (79%) 75% in the onset of the pandemic. These figures are (48%) 43% for (excess) returns, respectively, considering the peak of Covid.

[12] Our conclusion does not change also after considering CPI for inflation and GDP growth.

[13] In untabulated analyses, we obtain virtually similar results when we include state fixed effects instead of *GovResIndex* in the model, following Tosun (2022).

Table 11
Additional Risk Factors. This table presents estimates for Exposed × Post along with Overall Risk (Panel A) and Covid Risk (Panel B) as additional control variables. Original control variables are also included in the model. An intercept is included in the model but is not reported in this table. Return, Excess Return, Traded Volume, Dollar Volume, and Signed Volume are the dependent variables. Following Hassan et al. (2019, 2020), Overall Risk (Covid Risk) relies on word counts that condition on proximity to the use of synonyms for "risk" or "uncertainty". This measure counts the frequency of mentions of synonyms for risk or uncertainty divided by transcript length. Variable definitions are given in Table A.1 in Appendix. Time and firm fixed effects are included. Standard errors are clustered by firms and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Panel A: Controlling for Overall Risk

Covid Crisis:	Onset					Peak				
	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume
	I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
Exposed × Post	0.861***	0.903***	5.869***	0.332***	0.046***	0.513**	0.567***	1.774***	0.107***	0.038***
	(0.330)	(0.334)	(0.965)	(0.033)	(0.017)	(0.220)	(0.220)	(0.677)	(0.020)	(0.012)
Overall Risk	0.019***	0.019***	−0.001	−0.001	0.001***	0.008***	0.008***	−0.003	0.001	0.001***
	(0.004)	(0.004)	(0.005)	(0.001)	(0.000)	(0.002)	(0.002)	(0.003)	(0.001)	(0.000)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observation	35,402	35,402	35,522	35,522	35,381	77,845	77,845	78,313	78,313	77,800
Adj. R^2	0.359	0.485	0.110	0.071	0.124	0.263	0.429	0.043	0.070	0.074
Panel B: Controlling for Covid Risk										
Covid Crisis:	**Onset**					**Peak**				
	Return (%)	**Excess Return (%)**	**Traded Volume**	**Dollar Volume**	**Signed Volume**	**Return (%)**	**Excess Return (%)**	**Traded Volume**	**Dollar Volume**	**Signed Volume**
Exposed × Post	0.887***	0.928***	5.885***	0.333***	0.049***	0.540***	0.595***	1.790***	0.108***	0.041***
	(0.330)	(0.334)	(0.966)	(0.033)	(0.017)	(0.210)	(0.225)	(0.678)	(0.020)	(0.012)
Covid Risk	4.538***	4.650***	−1.419	−0.089**	0.208***	1.235*	1.256*	−1.703	−0.042	0.070*
	(1.583)	(1.593)	(1.501)	(0.045)	(0.080)	(0.706)	(0.711)	(1.168)	(0.032)	(0.040)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observation	35,402	35,402	35,522	35,522	35,381	77,845	77,845	78,313	78,313	77,800
Adj. R^2	0.358	0.485	0.110	0.071	0.122	0.263	0.429	0.043	0.070	0.073

Positive and statistically significant (at 1% level) coefficients for trading activity imply that investors have more demand for exposed firms throughout Covid. We repeat this exercise with the other three state level intervention indices. Statistically significant and robust findings for *Exposed* × *Post* in Table A.2 of the Appendix suggest that companies with the GFC experience perform better in stock markets during the pandemic compared to their peers when we control for various other state level factors.

7.5. Additional risk factors

We draw upon Hassan et al. (2019, 2020) widely cited study of various risk factors during Covid. We introduce *Overall Risk* and *Covid Risk* in our model measured following their methodology. Specifically, we use word counts in earnings conference calls that condition on the proximity to use the synonyms for "risk" or "uncertainty" overall; then, we scale this word count by the length of the transcript. We also repeat this exercise focusing on "risk" or "uncertainty" synonyms related to Covid only. The results in Table 11 show that both *Overall Risk* and *Covid Risk* increase stock (excess) return significantly throughout the Covid crisis while they have no influence on (dollar and signed) volume of shares traded. Nevertheless, we obtain robust results similar in magnitude to our original findings after controlling for these risk factors. Specifically in Panel A of Table 11, firms with learned survival skills earn 86% more than their peers in returns and 90% more in excess returns in the onset of Covid crisis. During the peak of the pandemic, those firms also earn 51% more in returns and 57% more in excess returns and have significantly higher trading activities than their peers. We obtain similar results in Panel B of Table 10 after controlling for *Covid Risk* in particular. Overall, these findings support our hypotheses and confirm that firms learning from the 2008 financial crisis outperform their unexposed peers during the pandemic.

8. Conclusion

In this paper, we have shown that taking a step back and examining events that posed a similar degree of shock to the financial system helps us better understand how markets capture and price risks associated with the Covid pandemic. We acknowledge that companies may have lived through several crises – including those of idiosyncratic nature – during their organisational history. Thus, each of these negative events might have contributed to those firms in preparation for the next major crisis – i.e., Covid in our setting. Without claiming that the Global Financial Crisis of 2008–9 is the sole experience responsible for these findings, we believe it is a

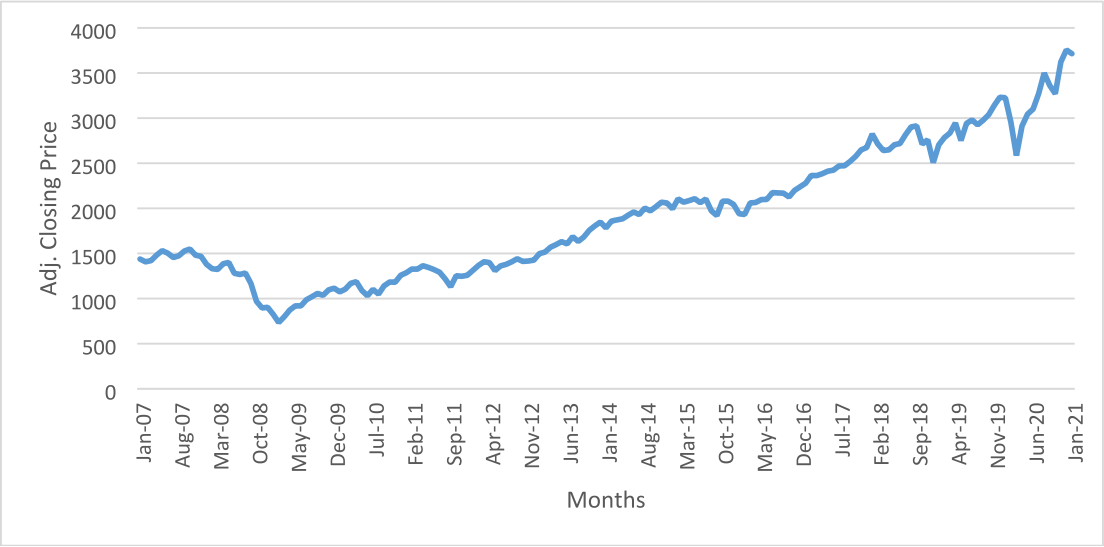

Fig. A1. S&P500 Adjusted Closing Prices. This figure presents monthly S&P500 adjusted closing prices between January 2007 and January 2021. This period includes the 2008 – 2009 Subprime Mortgage Crisis and the Covid Crisis.

particularly appropriate candidate as a measure of experience given the similarly unanticipated shocks exerted on the workforce, management, office space, supply chains, share price and associated financial metrics during both episodes. We find that, compared to their peers, firms exposed to GFC displayed more financial resilience during Covid. Specifically, their stock price losses were lower by a remarkable 95% compared to their peers which were not exposed to the GFC shock. This figure is both statistically and economically significant, and, compared to the control group, indicates billions of dollars of market value 'saved' by exposed firms.

Interestingly, this learning manifests itself not just through the CEOs who were previously exposed to the GFC but also through the rest of the organisation by creating imprints (Marquis and Tilcsik, 2013). Although CEOs are the first port of call when corporate disasters strike, and their decisions can make or break the firm at times of distress, the learning effect we document is not entirely subsumed by the CEO, but trickles down the organisation (Smith and Elliott, 2007). For example, exposed firms with new CEOs still outperform their unexposed peers during Covid as our results illustrate.

We run a wide range of robustness tests to examine the sensitivity of our findings to alternative financial proxies, different definitions of estimation windows and control firms. All tests confirm the core hypothesis that corporate exposure to prior disasters helps firms navigate the current turmoil, with additional organisational resilience gained through such experiences. We also notice that firms exposed to the GFC came better prepared in anticipation of the next crisis. For example, such firms increased their investments including capital expenditures and R&D 14% more than their peers did prior to Covid. While not the direct focus of our study, the question of which managerial skills and attributes may facilitate effective decisions of this nature (Akinci and Sadler-Smith, 2019), is an interesting research focus in and of itself (Amabile and Pratt, 2016).

In conclusion, our findings make important contributions to the finance literature on market reactions to pandemics, and to the management literature on organisational learning and imprinting through experiencing past disasters. From a practical point of view, our findings are also important to the corporate sector and policymakers given that the likelihood of similar pandemics in the future is viewed as non-trivial. Policymakers can provide a regulatory framework that encourages firms to pass on their experiences and learnings to smaller firms and start-ups through accelerator programmes, incubator programmes and regulatory sandboxes. In effect, technology transfer programmes should be envisioned to incorporate the 'technology' of coping with turbulence and volatility at the organisational level.

Future research can more thoroughly examine lessons firms can take away from a financial resilience point of view. In this paper, we did not have data on the level of exposure that each C-suite executive and non-exec board member had to prior disasters. Studies in the future can dig deeper into this aspect and tease out to what extent company policy can be influenced by prior experiences and imprints of senior management including and beyond the CEO. This line of inquiry can further examine childhood experiences as they are clearly shown to create more longstanding imprints – as shown, for example, by research into CEOs who spent their formative years during the Great Depression. Finally, this line of inquiry can examine the role that the media play in helping or mitigating how firms navigate turbulent times. In other words, researchers can examine how well the media (financial as well as general interest) help firms internalise their learnings and institutional experience when exposed to financial disasters.

We are grateful for comments by seminar participants at Cardiff University, Queen Mary University of London, University of Glasgow, and many informal discussions with our colleagues. All errors are our own, and the usual caveats apply.

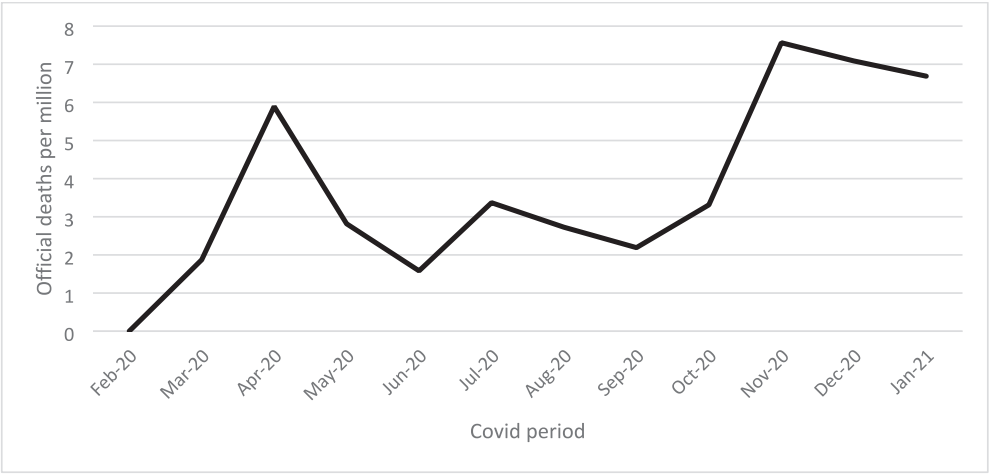

Fig. A2. Official Covid Deaths. This figure presents monthly new Covid deaths per million citizens in the US between February 2020 and January 2021. This period includes three Covid waves in the US. The data are obtained from https://covid19.who.int/ and https://ourworldindata.org/.

Table A1
Definition of Variables.

Variable	Description
Exposed	The dummy variable for the firms with stocks traded in NYSE, NYSE American, and NASDAQ throughout 2008 – 2009 subprime mortgage crisis and also during the Covid period; and zero for the firms with stocks traded only after 2008 – 2009 crisis and also during the Covid period.
Post	The monthly dummy variable that is equal to one from March 2020 to November 2020 (April 2020 for the onset); and zero from November 2019 to February 2020.
Return	The monthly stock return in percentage.
Excess Return	The monthly stock return in excess of the risk-free rate that is proxied by the one-month T-Bill rate.
Traded Volume	The number of shares traded monthly, in millions.
Dollar Volume	The number of shares traded multiplied by the monthly closing price, in billions USD.
Signed Volume	The number of shares traded multiplied by the monthly stock return, in ten millions.
Market Value	The monthly closing price multiplied by common shares outstanding, in billions USD.
Mktrf	The monthly market return in excess of the risk-free rate that is proxied by the one-month T-Bill rate. (Fama and French, 2015)
SMB	SMB (Small Minus Big) is the average return on the nine small stock portfolios minus the average return on the nine big stock portfolios. (Fama and French, 2015)
HML	HML (High Minus Low) is the average return on the two value portfolios minus the average return on the two growth portfolios. (Fama and French, 2015)
RMW	RMW (Robust Minus Weak) is the average return on the two robust operating profitability portfolios minus the average return on the two weak operating profitability portfolios. (Fama and French, 2015)
CMA	CMA (Conservative Minus Aggressive) is the average return on the two conservative investment portfolios minus the average return on the two aggressive investment portfolios. (Fama and French, 2015)

CRediT authorship contribution statement

Onur Kemal Tosun: Conceptualization, Writing – original draft, Data curation, Software, Methodology. **Arman Eshraghi:** Conceptualization, Writing – original draft, Methodology. **Gulnur Muradoglu:** Writing – original draft, Methodology.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to

Table A2
Additional Analysis on State and Government Intervention. This table presents estimates for *Exposed* × *Post* along with *StringencyIndex, ContHealthIndex,* and *EconSupportIndex* as additional control variables. *Return*, *Excess Return*, *Traded Volume, Dollar Volume,* and *Signed Volume* are the dependent variables. Original control variables are also included in the model. An intercept is included in the model but is not reported in this table. State and government intervention during Covid pandemic are controlled with the following variables relying on Covid Government Response Tracker by University of Oxford: *StringencyIndex* records the strictness of lockdown policies that primarily restrict people's behaviour; *ContHealthIndex* combines lockdown restrictions and closures with measures such as testing policy and contact tracing, short-term investment in healthcare, as well investments in vaccines; *EconSupportIndex* records measures such as income support and debt relief. These indices take values from 0 to 100. Variable definitions are given in Table A.1 in Appendix. Time and firm fixed effects are included. Standard errors are clustered by firms and given in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Panel A: Stringency Index as control										
Covid Crisis:	Onset					Peak				
	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume	Return (%)	Excess Return (%)	Traded Volume	Dollar Volume	Signed Volume
Exposed × Post	0.844**	0.889***	5.992***	0.339***	0.049***	0.496**	0.550**	1.872***	0.109***	0.043***
	(0.331)	(0.335)	(0.974)	(0.033)	(0.017)	(0.219)	(0.224)	(0.683)	(0.021)	(0.012)
Stringency Index	−0.138***	−0.138***	0.0700	0.004	−0.008***	−0.050***	−0.0506***	0.071***	0.002***	−0.002***
	(0.031)	(0.031)	(0.065)	(0.002)	(0.002)	(0.012)	(0.0125)	(0.027)	(0.001)	(0.001)
Controls, FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observation	34,820	34,820	34,937	34,937	34,799	76,584	76,584	77,045	77,045	76,539
Adj. R^2	0.361	0.489	0.111	0.072	0.124	0.266	0.434	0.045	0.069	0.074
Panel B: ContHealth Index as control										
Exposed × Post	0.765**	0.808**	6.065***	0.341***	0.046***	0.452**	0.505**	1.888***	0.109***	0.041***
	(0.331)	(0.335)	(0.975)	(0.033)	(0.017)	(0.219)	(0.223)	(0.684)	(0.020)	(0.012)
ContHealth Index	−0.166***	−0.168***	0.122*	0.005**	−0.009***	−0.087***	−0.088***	0.077**	0.002**	−0.003***
	(0.035)	(0.034)	(0.068)	(0.002)	(0.002)	(0.014)	(0.014)	(0.033)	(0.001)	(0.001)
Controls, FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observation	34,820	34,820	34,937	34,937	34,799	76,584	76,584	77,045	77,045	76,539
Adj. R^2	0.361	0.489	0.111	0.072	0.124	0.266	0.434	0.045	0.069	0.074
Panel C: EconSupport Index as control										
Exposed × Post	0.861***	0.906***	5.851***	0.339***	0.047***	0.460**	0.514**	1.816***	0.109***	0.040***
	(0.333)	(0.337)	(0.976)	(0.033)	(0.017)	(0.220)	(0.225)	(0.689)	(0.021)	(0.011)
EconSupportIndex	−0.022*	−0.022*	−0.049	0.001	−0.003***	−0.021***	−0.022***	0.001	0.001	−0.001***
	(0.013)	(0.013)	(0.030)	(0.001)	(0.001)	(0.004)	(0.004)	(0.011)	(0.001)	(0.000)
Controls, FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observation	34,820	34,820	34,937	34,937	34,799	76,584	76,584	77,045	77,045	76,539
Adj. R^2	0.361	0.488	0.111	0.072	0.123	0.266	0.434	0.044	0.069	0.074

influence the work reported in this paper.

Data availability

Data will be made available on request.

Appendix

See Fig. A1, Fig. A2, Table A1, Table A2.

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