Firms’ responses to the COVID-19 pandemic

Maximilian Klöckner a,⁎, Christoph G. Schmidt b, Stephan M. Wagner a, Morgan Swink b

a ETH Zurich, Department of Management, Technology, and Economics, Weinbergstrasse 56/58, 8092 Zurich, Switzerland
b Texas Christian University, Neeley Business School, PO Box 298530, Fort Worth, TX 76129, United States

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ABSTRACT

The COVID-19 pandemic requires firms to adequately respond. In this study, we first explore in our empirical data how firms responded to the COVID-19 crisis and identify five tactical response types, operational, digitalization, financial, supportive, and organizational responses. Furthermore, our findings indicate that responses vary in scope; some firms act on their own, while others engage in collaborations. Finally, we find that the response angle is different across firms, as some firms leverage potential and others primarily mitigate risk. Second, we follow an event study design to measure the financial implications of these responses. We find that responses to the COVID-19 pandemic generally entail a positive stock market reaction. Financial and digitalization responses, as well as risk mitigation responses, are consistently evaluated positively. We discuss our findings in context of different theoretical lenses, substantiating the emerging literature on the COVID-19 crisis, and the established literature on crisis response management.

1. Introduction

A crisis is understood as an unexpected, publicly known, and harmful event that exhibits high levels of uncertainty, and potentially disrupts firm operations (Bundy & Pfarrer, 2015; Bundy, Pfarrer, Short, & Coombs, 2017). While most crises are attributable to firm-specific or regional events, such as supply chain disruptions, data breaches, or environmental misconduct (Bode, Wagner, Petersen, & Ellram, 2011; Gwebu, Wang, & Wang, 2018; Lo, Tang, Zhou, Yeung, & Fan, 2018), firms have also experienced a series of global high-impact crises over the past decades. Well-known examples include the burst of the first dot-com bubble in 2000 (e.g., Dowell, Shackell, & Stuart, 2011), the 9/11 terrorist attacks (e.g., Li & Tallman, 2011; Vergne & Depeyre, 2016), the 2007–2009 financial crisis (e.g., de Figueiredo, Feldman, & Rawley, 2019; DesJardine, Bansal, & Yang, 2019), or the Brexit aftermath (e.g., Tielmann & Schiereck, 2017), as well as the ongoing climate crisis (e.g., Reid & Toffel, 2009; Wright & Nyberg, 2017). All of these had (or have) substantial effects on individuals, politics, and the economy (Bansal, Kim, & Wood, 2018; DesJardine et al., 2019; Wenzel, Stanske, & Lieberman, 2020).

Since 2020, a novel coronavirus SARS-CoV-2 (COVID-19) has spread rapidly around the world, prompting the World Health Organization (WHO) to declare a global pandemic on the 11th of March 2020. To limit the resulting healthcare emergency, governments have implemented strong measures, minimizing social gatherings, travel, and commerce (Wenzel et al., 2020). The restrictions created high levels of uncertainty for firms and largely disrupted firm operations (Sharma, Leung, Kingshott, Davcik, & Cardinalli, 2020; Verma & Gustafsson, 2020). For example, Volkswagen was forced to shut down production in several factories due to healthcare regulations (Hart, 2020). The overall financial consequences for firms were (and are) substantial. We believe that the COVID-19 pandemic constitutes an unexpected and disruptive event that creates a firm environment characterized by high levels of uncertainty. The resulting global crisis is a structurally novel setting, warranting empirical investigation from a crisis management perspective.

To ensure survival and maintain competitive advantage, firms experiencing a crisis are forced to respond, but often struggle to adequately do so (Bundy et al., 2017; Ketchen and Craighead, 2020) and Wenzel et al. (2020). According to Bundy and Pfarrer (2015), a crisis response is a set of coordinated communications and actions used to influence the outcomes and perceptions of the crisis (Coombs, 2007). During the COVID-19 crisis, these responses range from operational to financial. In the early stages of the pandemic, for instance, when medical equipment was in short supply, General Motors switched their production to ventilators, using their extensive network of suppliers (Colias, 2020). To alleviate the shortage of medical supplies, IBM launched its Rapid Supplier Connect platform, to connect institutional buyers, such as healthcare organizations and government agencies, with new suppliers (Anzalone, 2020). In April 2020, Hewlett Packard announced

⁎ Corresponding author.
E-mail addresses: mkloeckner@ethz.ch (M. Klöckner), christophschmidt@ethz.ch (C.G. Schmidt), stwagner@ethz.ch (S.M. Wagner), m.swink@tcu.edu (M. Swink).

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a variety of business partner and customer relief initiatives to support those struggling with the operational and financial challenges associated with the COVID-19 crisis (White, 2020). For example, they provided lenient financing and leasing options for end customers. Similarly, Ford also adapted their financing options and payment terms for customers and suppliers.

Crisis and firm responses to crises have been investigated in different settings and through various theoretical lenses across multiple disciplines (see Bundy et al., 2017; Wenzel et al., 2020). A vast body of management literature covers the antecedents and prevention of a crisis (e.g., DesJardine et al., 2019), the management and mitigation of an active crisis (e.g., Bode et al., 2011; Gweh et al., 2018), and the crisis outcomes, including financial and reputational consequences (Coombs, 2007; Li & Tallman, 2011). Focusing on the active crisis management phase, the strategic management literature mainly examines the different types of strategic responses to crises, and their implications (e.g., Bundy et al., 2017; Raihelin & Hock, 2021). However, there is a lack of interdisciplinary literature on tactical responses. Tactical responses are understood as short-term actions taken to implement the firm’s overarching response strategy (Bansal, Jiang, & Jung, 2015; DesJardine et al., 2019).

Simultaneously, there is a rapidly growing body of research on the COVID-19 crisis. Multiple studies across different disciplines investigate the implications of the COVID-19 crisis on, for example, workers and workplaces (e.g., Leonard, 2021; Nyberg, Shaw, & Zhu, 2021), (corporate) governance (e.g., Sharma, Borah, & Moses, 2021; Zattoni & Pugliese, 2021), or innovation and entrepreneurship (e.g., Ketchen & Craighead, 2020; Lee & Trimi, 2021; Rosa, 2021). As the COVID-19 crisis also directly affects production and global value chains, an emerging body of literature specifically examines the implications for operations and supply chain management (e.g., Ali, Arslan, Chowdhury, Khan, & Tarba, 2022; Shen & Sun, 2023; Shih, 2020). While the literature is mostly concerned with the impact of the crisis, there is a distinct lack of empirical studies on firm-level responses to the COVID-19 crisis, and their financial implications. Given the novel structure of the COVID-19 crisis, the potentially substantial financial consequences, and the necessity for research on tactical responses, we address two interlinked research questions: (1) How did firms respond to the COVID-19 crisis? and (2) What are the financial implications of these responses?

To answer our research questions, we build a sample of 376 announcements of responses taken by the constituent firms of the S&P 500 index, covering 11 industries. Based on the announcement texts, we inductively derive and identify five response types, and accordingly categorize our sample announcements as either operational, digitalization, financial, supportive, or organizational responses. In a second step, approaching the question on the financial implications of the responses, we conduct a short-term event study, measuring the response impact on firm value. An event study is a commonly used method to estimate the financial impact of complex firm decisions (e.g., Boyd, Kannan, & Slotegraaf, 2019; Kalaignanam, Kushwaha, Steenkamp, & Tuli, 2013). Accordingly, the method is an appropriate approach to provide a first assessment of the financial value that investors see in announced COVID-19 responses (Hendricks, Jacobs, & Singhal, 2020; McWilliams & Siegel, 1997). In general, we find that the announcement of COVID-19 responses is associated with a significant abnormal increase in firm value of 1.04%. Our results suggest that investors value financial and digitalization responses consistently positive. Compared to solo efforts, we further find that collaborative responses coordinated with business partners also evoke a consistently positive stock market reaction. In further analyses, we find that risk mitigation measures are more positively evaluated than responses leveraging upside potential. We also shed light on the role of the COVID-19 crisis severity, which we find to affect the evaluation of different responses. For example, in instances where firms are less severely affected by the pandemic, we find that collaborative responses evoke a significantly more positive stock market reaction than efforts by a single firm.

We discuss our empirical findings based on different theoretical lenses, using abductive reasoning to explain varying financial implications across crisis response types, scopes, and angles (Bamberger, 2018; Robinson, 2019). The contribution of our work is twofold. We are among the first to identify and investigate the firm responses to the COVID-19 crisis, and their effects on firm value. Our results add to the literature on crisis management and crisis responses by specifically examining the tactical measures that realize a firm’s response strategy (Bundy et al., 2017; Wenzel et al., 2020). Furthermore, we extend the emerging body of research on the COVID-19 crisis (Ali et al., 2022; Ketchen & Craighead, 2020; Nyberg et al., 2021; Verma & Gustafsson, 2020). While COVID-19-related management research is yet mainly conceptual in nature, our study adds first empirical insights that may support decision making in regard to the mitigation of risks associated with the COVID-19 crisis and future global high-impact crises.

2. Related literature

Following Bundy et al. (2017), we understand a crisis as “an event perceived by managers and stakeholders to be highly salient, unexpected, and potentially disruptive” (p. 1662). The vast body of literature on crises and crisis management spans multiple disciplines, including strategic management as well as organizational theory and behavior. We present literature along three crisis dimensions to illustrate the empirical setting of our study on the responses to the COVID-19 crisis. Specifically, we discuss the (1) crisis scope, (2) crisis stage, and (3) the crisis response.

2.1. Crisis scope

Firms are subject to multiple crises over time. From a scope perspective, most crises only relate to the affected firm itself or to a specific region (Wenzel et al., 2020). For example, the global ride-hailing firm Uber experienced a data breach in 2018, exposing private data related to 600,000 Uber drivers (Al-Muslim, 2018). The resulting crisis negatively affected financial performance and reputation, leading to a rework of Uber’s data privacy and internal data access policies. Analogously restricted to the scope of single firms, Raihelin and Hock (2021), for instance, investigate the match between product crises and product recall responses.

In contrast to such firm- or region-specific crises, firms rarely face global high-impact crises, which usually have detrimental consequences. As illustrated in Fig. 1, we structure such global high-impact crises along two dimensions, contagion and onset. Although having a global impact, many crises originate from a specific region at a discrete point of time. In these cases, the resulting disruptions for firms are due to spillovers of the crisis effects (i.e., effect contagion in Fig. 1). The Great East Japan Earthquake provides an example. In 2011, the earthquake and the corresponding tsunami severely damaged manufacturing and transportation infrastructure in the region, entailing a nuclear disaster at the Fukushima plant. This resulted in a crisis of automotive suppliers and other firms, and eventually induced negative spillover effects globally (e.g., Hendricks et al., 2020). To the contrary, other, even more scarce, global crises do not originate from a specific region at a discrete point of time, but are globally present, such as the climate crisis (e.g., Reid & Toffel, 2009; Wright & Nyberg, 2017) (i.e., cause contagion). The climate crisis also unfolds gradually, leaving more time for preparation (i.e., slow onset), unlike, for instance, the Fukushima disaster or the 9/11 terrorist attacks (e.g., Carnahan, Kryscynski, & Olson, 2017; Li & Tallman, 2011; Vergne & Depeyre, 2016) (i.e., sudden onset). Fig. 1 maps further crisis examples according to their contagion and onset characteristics.

The empirical setting of our study, the COVID-19 pandemic, is a global high-impact crisis that is structurally different according to both crisis dimensions. Unlike, for instance, the climate crisis, the
onset of the COVID-19 crisis was sudden and unexpected. Simultaneously, the source of the COVID-19 crisis, restrictions to contain the virus spread, is globally present. Hence, we argue that the COVID-19 pandemic presents an unprecedented and structurally unique crisis environment for firms worldwide, potentially evoking different firm responses and justifying elevated academic attention from a crisis management perspective.

### 2.2. Crisis stage

In their literature review, Bundy et al. (2017) identify three primary stages of a crisis: pre-crisis prevention, crisis management, and post-crisis outcomes. In the pre-crisis prevention stage, studies are concerned with how and why crises occur (e.g., Greve, Palmer, & Pozner, 2010). Wowak, Mannor, and Wowak (2015), for example, study the occurrence of product safety problems. The crisis management stage covers the actions of the organization when the crisis occurs and in its immediate aftermath. The actions taken within this stage are concerned with reducing the immediate harm of the crisis with a “fixing the problem” approach (Bode et al., 2011; Bundy et al., 2017). Gwebu et al. (2018), for instance, assess response strategies to data breaches in light of firm reputation. Another example in the context of a more large-scale crisis is a study by Reid and Toffel (2009), who explore how organizations respond to the increasing threat of climate change. Regarding the post-crisis stage, a large body of literature examines the outcomes of a crisis, in terms of financial performance, reparation, and stakeholder perception, as well as from an organizational learning perspective. Our study on responses to the COVID-19 crisis is set in the crisis management stage, as we assess responses that aim to mitigate the impact of the crisis and to prepare an efficient recovery (e.g., Li & Tallman, 2011).

### 2.3. Crisis response

Crisis responses can be either strategic or tactical. Strategic responses follow a long-term horizon and are associated with the flexibility of an organization to adapt to rapid changes in the environment (Bansal et al., 2015; DesJardine et al., 2019). The literature on crisis management is mainly concerned with strategic responses. Bode et al. (2011), for instance, examine strategic responses to supply chain disruptions. Wenzel et al. (2020) review prior works on strategic crisis responses and derive four response archetypes: retrenchment, persevering, innovating, and exit. Specifically related to our empirical setting, Ali et al. (2022) examine COVID-19-induced business structure adaptations in food supply chains, emphasizing the risk of strong offshoring reliance. Sharma et al. (2021) investigate the drivers of countries’ responses to the COVID-19 pandemic. Furthermore, Wang, Hong, Li, and Gao (2020) specifically assess marketing innovation responses to the COVID-19 pandemic, conceptually identifying four strategies taken by Chinese firms.

In contrast, tactical responses are understood as short-term, granular actions taken to implement an overarching response strategy (Bansal et al., 2015; DesJardine et al., 2019). Tactical responses create stability at the onset of a crisis (Bansal et al., 2015). Literature on tactical crisis responses specifically is scarce, with few notable exceptions. Early works show that short-term tactical responses can reduce the impact of a crisis, as opposed to a passive “waiting” approach (Butler & Sullivan, 2005; Quarantelli, 1988). DesJardine et al. (2019) examine both strategic and tactical responses to the 2007–2009 financial crisis. They find that strategic practices contribute more to organizational resilience than tactical practices, as they are better embedded within organizations. Similarly, Bansal et al. (2015) also explore the implications of strategic and tactical responses to the 2007–2009 financial crisis. In the context of highly uncertain humanitarian disasters, Comes, Van de Walle, and Van Wassenhove (2020) stress the importance of dynamic responses on a spectrum of tactical and strategic responses to adapt to new information.

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<table>
<thead>
<tr>
<th>Sudden onset</th>
<th>Slow onset</th>
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</thead>
<tbody>
<tr>
<td>(unexpected, no time to prepare)</td>
<td>(foreseeable, time to prepare)</td>
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</tbody>
</table>

- **9/11 terrorist attacks**  
  (e.g., Carnahan et al., 2017; Li & Tallman, 2011; Vergne & Depoeye, 2016)
- **Fukushima nuclear disaster**  
  (e.g., Hendricks et al., 2020)
- **Rana Plaza disaster**  
  (e.g., Jacobs & Singhal, 2017)
- **Dot-com bubble**  
  (e.g., Dowell et al., 2011)
- **2007-2009 financial crisis**  
  (e.g., Bansal et al., 2015; de Figueiredo Jr. et al., 2019; DesJardine et al., 2019)
- **Brexit economic aftermath**  
  (e.g., Tielmann & Schiereck, 2017)
- **Climate crisis**  
  (e.g., Reid & Toffel, 2009; Wright & Nyberg, 2017)

<table>
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<tr>
<th>Effect contagion</th>
<th>Cause contagion</th>
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</thead>
<tbody>
<tr>
<td>(source of the crisis is only regionally present; global disruptions due to crisis effect spillovers)</td>
<td>(source of the crisis is globally present; global disruptions due to omnipresent crisis source)</td>
</tr>
</tbody>
</table>

Fig. 1. Types and examples of global high-impact crises.
In response to the COVID-19 pandemic, Ahlstrom and Wang (2021) showcase multiple temporal tactics of pharmaceutical firms, conceptually highlighting the need for quick action in global crises. Xu, Sethi, Chung, and Choi (2023) outline a framework for pandemic responses, highlighting a wide range of tactical responses on an operational level to achieve the three major strategic objectives, responsiveness, resilience, and restoration, to secure firm survival and stabilize financial performance. Amankwah-Amoah (2020) look at operational responses specific to the airline industry. In addition, Vega, Arvidsson, and Saia (2023) investigate the tactical actions the Médecins Sans Frontières (MSF) takes to maintain operations after disruptions caused by the COVID-19 pandemic. However, in sum, the previous literature is sparse and provides few empirical insights on the different types of tactical responses to global crises and their direct and indirect financial implications.

3. Firm responses to the COVID-19 crisis

To approach our first research question on how firms have responded to the COVID-19 crisis, we build a sample of firm response announcements. In the following, we describe our sampling procedure and present the sample in detail.

3.1. Sampling procedure

We collect sample announcements based on a predefined pool of publicly traded firms. Like Cziraki, Mondria, and Wu (2021), we consider the constituents of the Standard & Poor’s (S&P) 500 index. This holds several advantages. First, the S&P 500 is widely considered the leading U.S. market index and one of the most important market indices globally. Hence, the index has often been used and validated in previous empirical studies to capture U.S. stock market effects (e.g., Cziraki et al., 2021; Jacobs & Singhal, 2017). Second, all 500 constituents are heavily traded NYSE or NASDAQ stocks. This supports the central assumption of an efficient market, which is inherently important to our methodological design. Third, the S&P 500 is a carefully composed cross-industry index, allowing us to examine a wide range of responses to the COVID-19 crisis, reducing the risk of specific industry idiosyncrasies driving our findings. Lastly, we deliberately focus on a (U.S.) single-country setting to not distort our results due to potential country heterogeneity, driven by structurally different (and time-lagged) courses of the pandemic and varying national policies and economic stimuli.

For each of the S&P 500 firms, we follow previous event study practice, searching for announcements in the leading news agencies PR Newswire and Business Wire (Barua & Mani, 2018). Our data collection spans the period between December 2019 and October 2020, sufficiently capturing the first and main wave of the pandemic in the U.S. For the keyword search string, we combined the firm name with variations of COVID-19 or Corona, to establish a relation to the pandemic, and with variations of keywords such as disrupt, impede, countermeasure, response, decline, suspend or react, to ensure a causal-reactive relationship between the COVID-19 crisis and the firm response. The keyword search led to a total of 6926 article texts. In a first step, we screened all headlines and excluded articles that were captured by our search string, but were no firm announcements. Examples include analyst reports, trading forecasts, and market outlooks. We further eliminated all duplicate articles that referred to the same COVID-19 response announcement. This first step left us with 802 potential announcements of firm responses to the COVID-19 crisis. In a second step, we then screened the full announcement texts, applying the following exclusion criteria to the 802 remaining announcements:

- The COVID-19 response announcement did not include an S&P 500 firm. We did not consider further (non-S&P 500) firms to maintain the integrity of our initial S&P 500 sampling strategy.
- The announcement was not a clear response to the COVID-19 crisis. When the announcement text did not explicitly link the response to the COVID-19 crisis, we excluded the article, ensuring the causal-reactive relationship between the pandemic and the announced firm response.
- A firm response was announced in a more general setting (e.g., an annual report) or in combination with a set of other distinct responses. In such cases, where it was not clear if one response dominated others, we did not consider the announcement to ensure an isolation of specific firm responses.

This procedure resulted in a set of 450 out of the initial 802 announcements of firm responses to the COVID-19 crisis. In a third step, ensuring that the stock market reaction is attributable to an announcement, we further eliminated announcements with confounding events on the announcement date (Faramarzi & Bhattacharya, 2021; McWilliams & Siegel, 1997). We also excluded announcements of firms with insufficient financial data available in the Thomson Reuters database. Our final sample consists of 376 COVID-19 response announcements from 191 unique firms. From these 191 firms, 87 firms made two or more distinct announcements during our data collection period. As investors may perceive subsequent announcements from the same firm differently, we consider only the first response announcement from each firm as a robustness check. Our empirical results remain consistent.

3.2. Sample categorization and description

Table 1 presents the distribution of our sample across industries, based on the two-digit Global Industry Classification Standard (GICS). Notably, the majority of COVID-19 response announcements is from Health Care firms (110; 29%), followed by firms from Consumer Discretionary (59; 16%) and Industrials (55; 15%). Fig. 2 further illustrates the S&P 500 index performance and the distribution of our sample announcements over time. The majority of COVID-19 responses was announced during and shortly after the sharp S&P 500 performance drop in mid-March 2020, supporting our sampling assumption that our announcements are indeed reactive responses to the COVID-19 crisis.

To address our first research question, we categorize our sample announcements along three dimensions, exploring how firms responded to the COVID-19 crisis. Specifically, we assess (1) the response type, (2) the response scope, and (3) the response angle, outlined in the following sections.

3.2.1. Response type

Firms have responded to the COVID-19 crisis in a number of ways. We understand the type of the response as the tactical, functional activity of a firm, as a reaction to the pandemic. To elicit response types, we follow an inductive and iterative process, guided by commonly applied qualitative data analysis procedures (Gioia, Corley, & Hamilton,
provides exemplary announcement excerpts for all response types. The author and the research assistant within the author team. Table 2 discussed and resolved cases of incongruent coding outcomes between the final category framework for validation, yielding a coding agreement rate of 0.73, which is substantial (Landis & Koch, 1977). We an independent research assistant coded all announcements based on the final category framework.

### Table 2: Exemplary announcement excerpts. Response type.

<table>
<thead>
<tr>
<th>Panel A (N = 17): Operational responses</th>
<th>Announcement source and date</th>
<th>Announcement excerpt</th>
</tr>
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<tbody>
<tr>
<td>PR Newswire, Mar 27, 2020</td>
<td>&quot;Venture Life Systems and GM Partner to Mass Produce Critical Care Ventilators in Response to COVID-19 Pandemic&quot;</td>
<td></td>
</tr>
<tr>
<td>PR Newswire, Mar 30, 2020</td>
<td>&quot;Honeywell Further Expands N95 Face Mask Production by Adding Manufacturing Capabilities in Phoenix&quot;</td>
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<tr>
<th>Panel B (N = 77): Digitalization responses</th>
<th>Announcement source and date</th>
<th>Announcement excerpt</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR Newswire, Apr 27, 2020</td>
<td>&quot;IBM Helping to Battle COVID-19 Medical Supply Chain Shortages with the Launch of IBM Rapid Supplier Connect [...]&quot;</td>
<td></td>
</tr>
<tr>
<td>Business Wire, Aug 25, 2020</td>
<td>&quot;C.H. Robinson today announced industry-leading connectivity integrating an unprecedented 19 transportation management systems (TMS) and enterprise resource planning (ERP) systems [...]&quot;</td>
<td></td>
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<tr>
<th>Panel C (N = 55): Financial responses</th>
<th>Announcement source and date</th>
<th>Announcement excerpt</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR Newswire, Apr 7, 2020</td>
<td>&quot;Darden Restaurants [...] today announced additional information given the dynamic environment resulting from COVID-19 and announced the details of a new term loan agreement.&quot;</td>
<td></td>
</tr>
<tr>
<td>Business Wire, Apr 20, 2020</td>
<td>&quot;Henry Schein Enhances Liquidity Position With New Credit Facility Totaling $700 Million; Company Also Amends Existing $750 Million Credit Facility&quot;</td>
<td></td>
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<tr>
<th>Panel D (N = 51): Supportive responses</th>
<th>Announcement source and date</th>
<th>Announcement excerpt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Wire, Apr 22, 2020</td>
<td>&quot;Hewlett Packard Enterprise (HPE) today announced dedicated relief initiatives for partners in support of business continuity in the wake of COVID-19. [...] These new interim initiatives have been specifically designed to relieve financial pressure on HPE partners and assist with business continuity planning.&quot;</td>
<td></td>
</tr>
<tr>
<td>PR Newswire, Jun 19, 2020</td>
<td>&quot;Ameren Illinois today announced it is expanding relief measures to customers who have been financially impacted by the coronavirus pandemic. [...] the Ameren Illinois COVID-19 Economic Hardship Recovery Program will offer flexible payment options and direct bill payment assistance to customers struggling to pay their energy bills.&quot;</td>
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<tr>
<th>Panel E (N = 16): Organizational responses</th>
<th>Announcement source and date</th>
<th>Announcement excerpt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Wire, Mar 31, 2020</td>
<td>&quot;Dollar Tree [...] today provided a business update regarding impacts related to the novel coronavirus (COVID-19) [...] to assist in minimizing exposure to COVID-19, the Company has taken several proactive, precautionary steps, [...] activating its Business Response Team to meet daily to communicate, assess and address potential exposure throughout the organization.&quot;</td>
<td></td>
</tr>
<tr>
<td>PR Newswire, May 18, 2020</td>
<td>&quot;Centene Corporation [...] announced today that it has convened a group of medical, non-profit and community leaders to form the Centene Health Disparities Task Force.&quot;</td>
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In a first step, one author carefully read all announcement texts, developing granular and unstructured first-order codes (e.g., factory shutdown, new product release, or taking up of loan). The author then grouped these codes to aggregated categories (e.g., we grouped factory shutdown and new product release, among others, under operational responses). Eventually, we identified five distinct response type categories, operational, financial, digitalization, supportive, and organizational responses, outlined below in order of sample frequency. In a final step, an independent research assistant coded all announcements based on the final category framework for validation, yielding a coding agreement rate of 0.73, which is substantial (Landis & Koch, 1977). We discussed and resolved cases of incongruent coding outcomes between the author and the research assistant within the author team. Table 2 provides exemplary announcement excerpts for all response types.

### Operational responses

We find that many firms responded to the COVID-19 crisis by implementing operational measures. Under operational responses, we subsume all (analogous) adjustments of manufacturing and service processes. Examples include the release of new products, production capacity up- or downscaling, adjustments of customer service processes, and related responses.

### Financial responses

Another type of COVID-19 responses address financial measures. To mitigate the negative impact of the pandemic, many firms announced responses targeted to improve the financial position of the firm and enhance liquidity. Examples include, but are not limited to, taking up of loans, capital increases, share repurchase programs, and investment suspensions.

### Digitalization responses

As a response to the COVID-19 crisis, some firms also invested in information technology (IT). Such investments
workshops. The support may be key stakeholders of the announcing firm. These stakeholders include employees, suppliers, customers, or communities. The support may help to increase flexibility and visibility, both of which are crucial implications of the COVID-19 crisis, predominantly involving support programs for digital platforms, analytics tools, or communication services necessary to facilitate work flexibility.

Supportive responses. Some firms took supportive action in response to the COVID-19 crisis, predominantly involving support programs for key stakeholders of the announcing firm. These stakeholders include employees, suppliers, customers, or communities. The support may be financial relief measures or non-financial actions, such as training or workshops.

Organizational responses. Finally, our sample of announcements contains a set of organizational responses. These responses relate to adjustments of the firm’s organizational structure and may include the formation of dedicated COVID-19 task forces or response teams, or specific new hires of experts.

3.2.2. Response scope

Beyond the (functional) type of the COVID-19 response, we find that the firm responses also vary in their scope. We define the response scope as the degree of inter-organizational collaboration. Analogous to the process described in Section 3.2.1, we coded our announcement texts with respect to the response scope (agreement rate of 0.75), introducing solo responses and collaborative responses. We refer to Table 3 for exemplary announcement excerpts.

Solo responses. The majority of firms implemented COVID-19 responses on their own. Such solo responses include different types of measures, ranging from intra-organizational process adjustments, over production upscaling, to firm-specific financial actions.

Collaborative responses. Firms that cooperated with other organizations to implement responses linked their activities with those of rival firms, supply chain partners, service providers, or other organizations like universities or public bodies. For instance, some firms entered into partnerships to co-develop new products, to leverage complementary (production) capacities, or to adopt inter-organizational technologies.

3.2.3. Response angle

Finally, we observe important differences in the COVID-19 response angle. Specifically, we differentiate between firm announcements that are associated with leveraging (upside) potential and announcements that relate to the mitigation of (downside) risk. We followed the process outlined in Section 3.2.1 to code our sample announcements along this dimension (agreement rate of 0.84). Table 4 presents corresponding announcement excerpt examples.

Leveraging upside potential. In multiple instances, firms’ responses to the COVID-19 crisis were related to potential gains, for example stemming from demand growth. Typical response announcements include production upscaling for high-demand goods, such as face masks, ventilators, or hand sanitizer, research collaborations, or new product development alliances.

Mitigating downside risk. Announcements that refer to the mitigation of downside risk are most commonly a result of negative COVID-19 implications, such as mobility restrictions or shrinking demand. Examples are production downscaling, store closures, or unexpected remote working arrangements.

In the following section, we turn to an assessment of the financial implications of these responses, before discussing the underlying mechanisms of different responses from a theoretical perspective.

4. Financial implications of firm responses

To address our second research question on the financial implications of COVID-19 responses, we assess the stock market reaction to the corresponding response announcements. The stock market reaction reflects the value investors collectively attribute to discrete initiatives, and may be a reasonable first step to answer the question regarding the financial implications of certain responses. We present our methodological design and the empirical results in the following sections.

4.1. Event study analysis

To assess the stock market reaction to our sample announcements, we follow an event study design (Barber & Lyon, 1996; Brown & Warner, 1985; Koo, Yamanoi, & Sakano, 2020). The event study method enables us to capture the impact of discrete announcements (i.e., events) on firm value. The method relies on the efficient market hypothesis (EMH), implying that (publicly) announced events are promptly reflected in a firm’s stock price (Hendricks et al., 2020; Zou & Li, 2016). In our empirical context, we apply the event study methodology to assess the financial impact (more specifically, the short-term stock market reaction) of firm response announcements to the COVID-19 crisis.

Under normal market conditions, the standard event study procedure requires the computation of abnormal returns as the difference between actually observed firm returns and expected returns. The expected returns represent benchmark returns, and are commonly estimated using expected return models, such as the simple market model (e.g., Hendricks et al., 2020; Zou & Li, 2016) or the more advanced Fama–French four-factor model (e.g., Faramarzi & Bhattcharya, 2021; Kalaignanam et al., 2013). However, the COVID-19 crisis presents an exogenous and unprecedented shock, challenging (stock) market conditions on a global scale. Markets were systemically distressed over the course of the COVID-19 crisis, characterized by substantially negative returns and increased volatility. Given these conditions, it appears critical to deviate from the standard methodology. Specifically, we follow Hendricks, Hora, and Singhal (2015) and use risk-adjusted returns from a control group of firms as benchmark returns. Control firms that have been similarly affected by the COVID-19 crisis, but did not announce a COVID-19 response, provide a fair benchmark for the computation of abnormal returns. In the remainder of this section, we discuss the key design elements of our analysis, including the collection of financial firm data, the composition of the control group, the computation of abnormal returns, and the statistical testing procedure.
4.1. Collection of financial firm data

We retrieve relevant financial firm data from the Thomson Reuters database (e.g., Klockner, Schmidt, & Wagner, 2022; Lo et al., 2018). Specifically, we access daily stock closing prices for our sample firms and the S&P 500 index between January 2019 and December 2020, and compute observed returns as the daily percentage change of stock closing prices (Kalaignanam et al., 2013). We also leverage the Thomson Reuters database to recover financial firm data, including total assets, financial leverage (debt-to-equity), return on assets (ROA), market-to-book ratio, and industry affiliation (based on Global Industry Classification Standard (GICS) codes). We use daily U.S. Fama–French factors and the momentum factor from the Dartmouth College database to risk-adjust the observed raw returns (Fama & French, 1993; Faramarzi & Bhattacharya, 2021).

4.1.2. Composition of the control group

We build a control group containing firms that match our sample firms on key financial characteristics and industry affiliation, but did not announce a COVID-19 response. Such firms provide a fair benchmark for the computation of abnormal returns. To identify suitable matching candidates, we use a propensity score matching (PSM) benchmark (Boyd et al., 2019; Hendricks et al., 2015). PSM builds on the central idea of estimating the likelihood for potential matching candidates of being constituents of our sample, based on a predefined set of observable firm factors. Potential matching candidates are all NYSE- and NASDAQ-listed firms, which are not constituents of our S&P 500-based sample frame. We consider key financial firm characteristics, namely firm size, market-to-book ratio, leverage and return on assets (ROA), as well as the GICS two-digit industry affiliation, as matching variables (Barber & Lyon, 1996; Clarke, Chen, Du, & Hu, 2021). Table A.1 provides a detailed description for all explanatory variables. We estimate the following logit model on the merged data set of our sample firms and the matching candidates in the same four-digit GICS industry that is closest based on its propensity score. Our results remain structurally consistent when using the second, third, fourth, or fifth nearest-neighbor for the control group composition. For each matching firm, we verified that it did not announce a COVID-19 response in the corresponding event window, following our initial data collection strategy (see Section 3.1). In case of a matched firm COVID-19 response announcement, we replaced the firm with the next nearest neighbor matched firm (Boyd et al., 2019). Table A.3 presents the descriptive statistics for both our sample firms and the control group firms.

4.1.3. Computation of abnormal returns

To enable the computation of abnormal returns, we follow common event study practice and use a trading day calendar, denoting Day 0 as the COVID-19 response announcement date, Day 1 as the following trading day, Day -1 as the previous trading day, etc. Koo et al. (2020) and Lo et al. (2018). Announcements made on non-trading days or after stock exchange trading hours (4:00 P.M. for NYSE and NASDAQ) were shifted to the next possible trading day (Hendricks et al., 2015).

We compute abnormal returns \( \Delta R_i \) as the difference between the risk-adjusted returns of our sample firms and the risk-adjusted returns of the corresponding control firms (Hendricks et al., 2015), given by:

\[
\Delta R_i = R_{i,t|risk,control} - R_{i,t|risk,sample}
\]  

We implement the Fama–French four-factor model to risk-adjust the returns of our sample and control firms (Carhart, 1997; Fama & French, 1993; Faramarzi & Bhattacharya, 2021),

\[
R_{i,t|risk} = R_{i,t} - E(R_{i,t}) - \hat{\alpha}_i + \hat{\beta}_1 R_{m,t} + \hat{\beta}_2 R_{f,t} + \hat{\beta}_3 H M L_i + \hat{\beta}_4 U M D_i,
\]

where \( R_{i,t} \) is the observed raw return for stock \( i \) on day \( t \), \( R_{m,t} \) is the S&P 500 benchmark return on day \( t \), \( R_{f,t} \) is the factor accounting for market cap differences (i.e., delta returns of small and big firms) on day \( t \), \( H M L_i \) is the factor accounting for market-to-book differences (i.e., delta returns of high and low market-to-book firms) on day \( t \), and \( U M D_i \) is the momentum factor on day \( t \) (Carhart, 1997). The coefficients \( \hat{\alpha}_i, \hat{\beta}_1, \hat{\beta}_2, \hat{\beta}_3, \) and \( \hat{\beta}_4 \) are estimators from an OLS regression over a 200-trading day estimation period, ending 10 days before the COVID-19 response announcement (e.g., Hendricks et al., 2015; Lo et al., 2018).

Consistent with prior research, we present a five-day event window surrounding the announcement date (e.g., Kalaignanam et al., 2013). We compute the mean abnormal return \( \overline{\Delta R_i} \) for day \( t \) as,

\[
\overline{\Delta R_i} = \frac{1}{N} \sum_{i=1}^{N} \Delta R_{i,t}
\]

where \( N \) is our sample size. We further calculate cumulative abnormal returns \( C AR_{i,t|t_1,t_2} \) as the sum of abnormal returns over a given time window \( (t_1,t_2) \), given by,

\[
C AR_{i,t|t_1,t_2} = \sum_{t=t_1}^{t_2} \Delta R_{i,t}
\]
Mean cumulative abnormal returns are analogously computed as,

$$\frac{\sum_{j=1}^{N} CAR_{(t_1,t_2)}}{\sum_{j=1}^{N} \hat{AR}}$$  \hspace{1cm} (6)

where mean (cumulative) abnormal returns can be influenced by outlier values, we also calculate and report median (cumulative) abnormal returns and the share of positive (cumulative) abnormal returns (Hendricks et al., 2020).

### 4.1.4. Statistical testing procedure

We use several commonly validated statistical tests to assess the significance of the stock market effects. For the mean abnormal return, we compute the test statistic from Brown and Warner (1985). The Brown-Warner (BW) t-test is appropriate in our context, given that our sample contains few dates with more than one firm announcing a COVID-19 response (see also Fig. 2). Known as event-date clustering, this may cause cross-sectional dependence in abnormal returns. The robust BW t-test is commonly applied to account for this effect (e.g., Hendricks et al., 2020). Jacobs & Singhal (2017). The test statistic for a cumulative single day period \(t\) is given by,

$$TS_{BW,t} = \frac{\bar{AR}}{\sqrt{\bar{AR}}}$$  \hspace{1cm} (7)

where \(\bar{AR}\) is the standard deviation of daily mean abnormal returns during the estimation period, given by

$$\bar{AR} = \frac{1}{\sqrt{N}} \sqrt{\sum_{t=1}^{N-1} (\bar{AR}_t - \bar{AR})^2}$$  \hspace{1cm} (8)

Likewise, the test statistic for a cumulative \(j\)-day period \((t_1, t_2)\) is,

$$TS_{BW,(t_1,t_2)} = \frac{\sum_{t=t_1}^{t_2} \bar{AR}}{\sqrt{\sum_{t=t_1}^{t_2} \bar{AR}}}$$  \hspace{1cm} (9)

Similar to prior studies, we test the median (cumulative) abnormal returns using nonparametric Wilcoxon-signed rank tests and the percentage of positive (cumulative) abnormal returns using binomial sign tests (Hendricks et al., 2020; Lo et al., 2019).

### 4.2. Empirical results

To explore the financial implications of COVID-19 responses, we assess the short-term stock market reaction to their announcements. We first present the overall stock market effects for our full sample of COVID-19 response announcements, after we turn to an assessment of different response types, the response scope, and the response angle.

#### 4.2.1. Results for the full sample

Table 5 presents our event study results for the full sample of COVID-19 response announcements. As indicated, we present mean, median, and the percentage of positive abnormal return metrics, and report Brown-Warner t-test, Wilcoxon signed rank test, and binomial sign test statistics.

As suggested by Table 5, there is no consistently significant increase in firm value within the two trading days prior to the announcement. On the announcement day (i.e., Day 0; Column 3), we observe a positive stock market reaction, with a mean (median) abnormal return of 0.51% (0.36%), which is statistically significant \((TS_{BW} = 5.30, p = 0.000; Z_{Wilcoxon} = 2.12, p = 0.017)\). Furthermore, 54.79% of our sample firms experience a positive abnormal return \((Z_{Binomial} = 1.81, p = 0.035)\). On the trading day following the response announcement (i.e., Day 1; Column 4), we see a continuing positive stock market reaction. The mean (median) abnormal return is 0.53% (0.26%) \((TS_{BW} = 5.45, p = 0.000; Z_{Wilcoxon} = 2.48, p = 0.007)\). Subsequently, the positive effect subsides, as we do not observe a significant stock market reaction on Day 2 after the announcement (see Column 5). Column 6 of Table 5 presents the cumulative positive impact of COVID-19 response announcements, aggregating Day 0 and Day 1. The mean (median) cumulative abnormal return for the two-day [0, 1]-window is 1.04% (0.64%) \((TS_{BW} = 7.60, p = 0.000; Z_{Wilcoxon} = 3.14, p = 0.001)\). A mean cumulative abnormal return of 1.04% corresponds to approximately $280 million in firm value for the median firm in our sample. Collectively, these results strongly suggest that investors positively value the action of firms to implement COVID-19 responses.

#### 4.2.2. Results by response type

As described in Section 3.2.1, we break our sample into sub-samples based on the functional type of the COVID-19 response. We differentiate between operational, digitalization, financial, supportive, and organizational responses. Table 6 presents the event study results for each of the five sub-samples. We observe that the overall positive stock market reaction is mainly driven by digitalization responses (Panel B of Table 6) and financial responses (Panel C of Table 6), as these two response types evoke consistently significant positive evaluations by investors. As indicated by Panel B and Column 6, the announcement of digitalization responses is associated with a significantly positive mean (median) cumulative abnormal return of 0.83% (1.08%) for the [0, 1]-window \((TS_{BW} = 3.07, p = 0.001; Z_{Wilcoxon} = 2.37, p = 0.009)\). Likewise, according to Panel C, investors positively evaluate financial responses, reflected in a mean (median) cumulative abnormal return of 2.25% (1.16%) for the two-day window \((TS_{BW} = 5.26, p = 0.000; Z_{Wilcoxon} = 2.18, p = 0.015)\). The stock market reaction to financial responses is significantly different from the other response types \((p = 0.100)\). Operational, supportive and organizational responses evoke no consistently significant stock market reaction (see Panels A, D and E of Table 6).

#### 4.2.3. Results by response scope

With respect to the response scope, we compare stock market reactions of firms that announce responses on their own (i.e., solo responses) to reactions for firms that cooperate with other organizations to implement specific measures (i.e., collaborative responses). Table 7 presents the event study results for both sub-samples. As suggested by Panel A and Column 6, announcements of solo responses are associated with a positive and significant mean (median) cumulative abnormal return of 1.01% (0.30%) \((TS_{BW} = 5.94, p = 0.000; Z_{Wilcoxon} = 1.89, p = 0.030)\), but the percentage of positive cumulative abnormal returns (53.20%) is not significant. In contrast, announcements of collaborative responses experience a consistently significant and positive valuation by investors. As shown in Panel B and Column 6, the mean (median) cumulative abnormal return is 1.11% (0.88%) for the aggregated two-day window \((TS_{BW} = 4.58, p = 0.000; Z_{Wilcoxon} = 2.93, p = 0.002)\).
Table 6
Event study results. Response type.

<table>
<thead>
<tr>
<th></th>
<th>Day -2</th>
<th>Day -1</th>
<th>Day 0</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Days [0, 1]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: Operational responses (N = 177)</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mean abnormal return</td>
<td>-0.27%</td>
<td>-0.08%</td>
<td>0.57%</td>
<td>0.44%</td>
<td>-0.07%</td>
<td>1.01%</td>
</tr>
<tr>
<td>Brown-Warner t-test (t-statistic)</td>
<td>(-1.90)**</td>
<td>(-0.54)***</td>
<td>(4.09)**</td>
<td>(3.15)**</td>
<td>(-0.47)**</td>
<td>(5.12)**</td>
</tr>
<tr>
<td>Median abnormal return</td>
<td>0.00%</td>
<td>0.01%</td>
<td>0.32%</td>
<td>0.26%</td>
<td>0.28%</td>
<td>0.27%</td>
</tr>
<tr>
<td>Wilcoxon signed rank test (Z-statistic)</td>
<td>(0.61)</td>
<td>(0.02)</td>
<td>(1.42)*</td>
<td>(1.46)*</td>
<td>(1.01)</td>
<td>(1.58)*</td>
</tr>
<tr>
<td>Percent positive abnormal returns</td>
<td>49.15%</td>
<td>50.28%</td>
<td>54.80%</td>
<td>55.37%</td>
<td>53.67%</td>
<td>53.11%</td>
</tr>
<tr>
<td>Binomial sign test (Z-statistic)</td>
<td>(-0.15)</td>
<td>(0.00)</td>
<td>(1.26)</td>
<td>(1.35)*</td>
<td>(0.90)</td>
<td>(0.75)</td>
</tr>
<tr>
<td><strong>Panel B: Digitalization responses (N = 77)</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mean abnormal return</td>
<td>-0.09%</td>
<td>0.53%</td>
<td>0.21%</td>
<td>0.61%</td>
<td>0.20%</td>
<td>0.83%</td>
</tr>
<tr>
<td>Brown-Warner t-test (t-statistic)</td>
<td>(-0.49)</td>
<td>(2.77)**</td>
<td>(1.12)</td>
<td>(3.23)**</td>
<td>(1.07)</td>
<td>(3.07)**</td>
</tr>
<tr>
<td>Median abnormal return</td>
<td>0.10%</td>
<td>0.66%</td>
<td>0.43%</td>
<td>0.21%</td>
<td>0.17%</td>
<td>1.06%</td>
</tr>
<tr>
<td>Wilcoxon signed rank test (Z-statistic)</td>
<td>(0.27)</td>
<td>(0.99)</td>
<td>(1.45)*</td>
<td>(1.58)*</td>
<td>(0.93)</td>
<td>(2.37)**</td>
</tr>
<tr>
<td>Percent positive abnormal returns</td>
<td>51.95%</td>
<td>53.25%</td>
<td>59.74%</td>
<td>55.84%</td>
<td>51.95%</td>
<td>59.74%</td>
</tr>
<tr>
<td>Binomial sign test (Z-statistic)</td>
<td>(0.23)</td>
<td>(0.46)</td>
<td>(1.60)*</td>
<td>(0.91)</td>
<td>(0.23)</td>
<td>(1.60)*</td>
</tr>
<tr>
<td><strong>Panel C: Financial responses (N = 55)</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mean abnormal return</td>
<td>-1.42%</td>
<td>-0.53%</td>
<td>0.57%</td>
<td>1.67%</td>
<td>1.54%</td>
<td>2.25%</td>
</tr>
<tr>
<td>Brown-Warner t-test (t-statistic)</td>
<td>(-4.70)*****</td>
<td>(-1.76)*</td>
<td>(1.90)*</td>
<td>(5.54)*****</td>
<td>(5.10)*****</td>
<td>(5.26)*****</td>
</tr>
<tr>
<td>Median abnormal return</td>
<td>-0.52%</td>
<td>0.27%</td>
<td>0.92%</td>
<td>1.56%</td>
<td>0.39%</td>
<td>1.16%</td>
</tr>
<tr>
<td>Wilcoxon signed rank test (Z-statistic)</td>
<td>(-1.66)*</td>
<td>(0.12)</td>
<td>(1.13)</td>
<td>(1.81)*</td>
<td>(0.91)</td>
<td>(2.18)*</td>
</tr>
<tr>
<td>Percent positive abnormal returns</td>
<td>43.64%</td>
<td>59.91%</td>
<td>56.36%</td>
<td>58.18%</td>
<td>52.73%</td>
<td>61.82%</td>
</tr>
<tr>
<td>Binomial sign test (Z-statistic)</td>
<td>(-0.81)</td>
<td>(0.00)</td>
<td>(0.81)</td>
<td>(1.08)</td>
<td>(0.27)</td>
<td>(1.62)*</td>
</tr>
<tr>
<td><strong>Panel D: Supportive responses (N = 51)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean abnormal return</td>
<td>-0.24%</td>
<td>-0.17%</td>
<td>0.98%</td>
<td>-0.38%</td>
<td>-0.80%</td>
<td>0.66%</td>
</tr>
<tr>
<td>Brown-Warner t-test (t-statistic)</td>
<td>(-1.08)</td>
<td>(-0.76)</td>
<td>(4.40)*****</td>
<td>(-1.69)*</td>
<td>(-3.60)*****</td>
<td>(1.92)*</td>
</tr>
<tr>
<td>Median abnormal return</td>
<td>-0.25%</td>
<td>0.11%</td>
<td>0.43%</td>
<td>0.05%</td>
<td>-0.09%</td>
<td>0.20%</td>
</tr>
<tr>
<td>Wilcoxon signed rank test (Z-statistic)</td>
<td>(-0.32)</td>
<td>(0.05)</td>
<td>(0.88)</td>
<td>(0.03)</td>
<td>(-1.11)</td>
<td>(0.65)</td>
</tr>
<tr>
<td>Percent positive abnormal returns</td>
<td>47.06%</td>
<td>50.98%</td>
<td>50.98%</td>
<td>50.98%</td>
<td>47.06%</td>
<td>52.94%</td>
</tr>
<tr>
<td>Binomial sign test (Z-statistic)</td>
<td>(-0.28)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(-0.28)</td>
<td>(0.28)</td>
<td>(0.28)</td>
</tr>
<tr>
<td><strong>Panel E: Organizational responses (N = 16)</strong></td>
<td></td>
<td></td>
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<tr>
<td>Mean abnormal return</td>
<td>-1.71%</td>
<td>0.28%</td>
<td>-0.36%</td>
<td>0.05%</td>
<td>-0.35%</td>
<td>-0.31%</td>
</tr>
<tr>
<td>Brown-Warner t-test (t-statistic)</td>
<td>(-2.87)**</td>
<td>(0.46)</td>
<td>(-0.60)</td>
<td>(0.08)</td>
<td>(-0.58)</td>
<td>(-0.36)</td>
</tr>
<tr>
<td>Median abnormal return</td>
<td>-0.44%</td>
<td>0.88%</td>
<td>-0.89%</td>
<td>0.85%</td>
<td>-0.00%</td>
<td>0.09%</td>
</tr>
<tr>
<td>Wilcoxon signed rank test (Z-statistic)</td>
<td>(-0.94)</td>
<td>(0.78)</td>
<td>(-0.53)</td>
<td>(0.43)</td>
<td>(-0.28)</td>
<td>(0.53)</td>
</tr>
<tr>
<td>Percent positive abnormal returns</td>
<td>31.25%</td>
<td>62.50%</td>
<td>37.50%</td>
<td>62.50%</td>
<td>50.00%</td>
<td>50.00%</td>
</tr>
<tr>
<td>Binomial sign test (Z-statistic)</td>
<td>(-1.25)</td>
<td>(0.75)</td>
<td>(-0.75)</td>
<td>(0.75)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
</tbody>
</table>

*p < 0.10, **p < 0.05, ***p < 0.01; all tests are one-tailed; N = 376.

Table 7
Event study results. Response scope.

<table>
<thead>
<tr>
<th></th>
<th>Day -2</th>
<th>Day -1</th>
<th>Day 0</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Days [0, 1]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: Solo responses (N = 250)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mean abnormal return</td>
<td>-0.78%</td>
<td>0.15%</td>
<td>0.51%</td>
<td>0.50%</td>
<td>0.23%</td>
<td>1.01%</td>
</tr>
<tr>
<td>Brown-Warner t-test (t-statistic)</td>
<td>(-6.48)*****</td>
<td>(1.24)</td>
<td>(4.25)*****</td>
<td>(4.15)*****</td>
<td>(1.93)*****</td>
<td>(5.94)*****</td>
</tr>
<tr>
<td>Median abnormal return</td>
<td>-0.16%</td>
<td>0.34%</td>
<td>0.34%</td>
<td>0.25%</td>
<td>0.31%</td>
<td>0.30%</td>
</tr>
<tr>
<td>Wilcoxon signed rank test (Z-statistic)</td>
<td>(-1.79)*</td>
<td>(1.39)*</td>
<td>(1.35)*</td>
<td>(1.66)*</td>
<td>(0.79)</td>
<td>(1.89)*</td>
</tr>
<tr>
<td>Percent positive abnormal returns</td>
<td>48.00%</td>
<td>54.00%</td>
<td>52.40%</td>
<td>54.00%</td>
<td>52.40%</td>
<td>53.20%</td>
</tr>
<tr>
<td>Binomial sign test (Z-statistic)</td>
<td>(-0.57)</td>
<td>(1.20)</td>
<td>(0.70)</td>
<td>(1.20)</td>
<td>(0.70)</td>
<td>(0.95)</td>
</tr>
<tr>
<td><strong>Panel B: Collaborative responses (N = 126)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean abnormal return</td>
<td>0.18%</td>
<td>-0.35%</td>
<td>0.52%</td>
<td>0.59%</td>
<td>-0.13%</td>
<td>1.11%</td>
</tr>
<tr>
<td>Brown-Warner t-test (t-statistic)</td>
<td>(1.07)</td>
<td>(-2.02)*</td>
<td>(3.04)**</td>
<td>(3.43)*****</td>
<td>(-0.74)</td>
<td>(4.58)*****</td>
</tr>
<tr>
<td>Median abnormal return</td>
<td>-0.03%</td>
<td>-0.11%</td>
<td>0.43%</td>
<td>0.57%</td>
<td>0.08%</td>
<td>0.88%</td>
</tr>
<tr>
<td>Wilcoxon signed rank test (Z-statistic)</td>
<td>(-0.07)</td>
<td>(-0.76)</td>
<td>(1.89)*</td>
<td>(2.10)*</td>
<td>(0.44)</td>
<td>(2.93)***</td>
</tr>
<tr>
<td>Percent positive abnormal returns</td>
<td>47.62%</td>
<td>46.83%</td>
<td>59.52%</td>
<td>58.73%</td>
<td>51.59%</td>
<td>60.32%</td>
</tr>
<tr>
<td>Binomial sign test (Z-statistic)</td>
<td>(-0.45)</td>
<td>(-0.62)</td>
<td>(2.05)*</td>
<td>(1.87)*</td>
<td>(0.27)</td>
<td>(2.23)*</td>
</tr>
</tbody>
</table>

*p < 0.10, **p < 0.05, ***p < 0.01; all tests are one-tailed; N = 376.

60.32% of collaborative responses announcements are associated with positive cumulative abnormal returns (Z_Binomial = 2.23, p = 0.013). However, both Panels do not significantly differ (p = 0.440).

4.2.4. Results by response angle

Arguably, the response angle, differentiating between responses that are related to potential gains (i.e., leveraging upside potential) and responses that aim at reducing potential damage (i.e., mitigating downside risk), is crucial when assessing the stock market reaction. This is because one could reasonably assume that investors positively evaluate gaining potentials, as expected future cash flows are likely to rise when firms announce new product development alliances or production upscaling. However, the event study results as depicted in Table 8 suggest the opposite. As indicated by Panel A and Column 6, the abnormal return metrics for COVID-19 responses leveraging upside potential are positive, but not consistently significant. In contrast, Panel B and Column 6 suggest that mitigating downside risk responses experience a strongly positive and significant stock market reaction,
with a mean (median) cumulative abnormal return of 1.77% (0.72%) for the two-day window \((T S_{BW} = 8.50, p = 0.000; Z_{\text{Wilcoxon}} = 2.52, p = 0.006)\). Furthermore, 57.14% of our sample firms experience positive cumulative abnormal returns \((Z_{\text{Binomial}} = 1.78, p = 0.038)\). The mean cumulative returns of both Panels differ significantly from each other \((p = 0.041)\), indicating that investors value announcements of risk mitigation responses more positively.

### 4.2.5. The role of the COVID-19 crisis severity

Firms across industries have been differently affected by the COVID-19 crisis. For instance, while airlines and hospitality firms were severely hit by decreased demand, firms in industries including electronics, biotech, and consumer goods may have benefited from rising demand. As the response to a crisis clearly depends on specific situational factors \((\text{Bode et al., 2011; Bundy \& Pfarrer, 2015})\), we further explore how the COVID-19 severity for firms affects the stock market reaction to different responses. Please note that the crisis severity is conceptually different from the previously illustrated response angle. While the response angle is a dimension of the firm’s tactical response (alike type and scope), the severity is a largely exogenous situational factor. For instance, a firm can be severely hit by the COVID-19 crisis, but still leverage upside potential (e.g., switching production lines to high-demand items). Conversely, a firm can be relatively less affected and yet mitigate downside risk (e.g., preventively closing a facility).

To examine a potential effect of the COVID-19 crisis severity, we compute the pre-announcement stock market performance for all of our sample observations, based on buy-and-hold returns over a period of 60 trading days (i.e., three months) prior to the respective COVID-19 response announcement. Our results are structurally robust to different pre-announcement time periods (i.e., 20, 40, or 80 trading days). We assume the pre-announcement stock market performance to be a reasonable proxy for the severity of the COVID-19 crisis for affected firms. We then split our sample along the median of the pre-announcement stock market performance, yielding two equally sized sub-samples of responses from firms that performed relatively better (i.e., lower severity) and from firms that performed relatively worse (i.e., higher severity) at the onset of the COVID-19 crisis. We then conduct a separate event study for each sub-sample.

Table 9 shows the corresponding results. As indicated by Panel B, Column 6, the mean (median) cumulative abnormal return for severely affected firms is 1.71% (0.67%). This positive value is statistically significant \((T S_{BW} = 9.62, p = 0.000; Z_{\text{Wilcoxon}} = 2.95, p = 0.002)\). The mean return metrics are significantly more positive than the mean returns for less severely impacted firms \((p = 0.029)\).

We use this sample split to further explore the interactions between the COVID-19 crisis severity and different response types, scopes, and angles. Tables 10–12 present corresponding event study splits, showing cumulative abnormal return metrics for the \([0, 1]\)-window. Regarding the response type, both digitalization and financial responses are evaluated more positively when they come from firms that have been more severely affected (Columns 2 and 3 of Table 10) (differences significant, \(p = 0.086\) for digitalization responses and \(p = 0.004\) for financial responses). With respect to the response scope, Table 11 suggests that collaborative responses are evaluated significantly positively, independent of the crisis severity. In the lower severity condition, collaborative responses are evaluated significantly more positive than solo responses.
firms’ crisis responses and assessing the associated stock market responses, based on their type, scope, angle, and contingent on the COVID-19 crisis. We further show how investors evaluate these responses, which has no significant difference in cases of higher crisis severity (𝑝 < 0.05). Furthermore, according to Column 1, we find solo responses to be more worthwhile for firms that have been more severely affected by the COVID-19 crisis (significant difference, 𝑝 = 0.024). Finally, Table 12 presents the interaction effects between the response angle and the COVID-19 crisis severity. In instances of relatively lower severity, leveraging upside potential seems more reasonable (Column 1, significant difference, 𝑝 = 0.007), whereas the mitigation of downside risk is valued significantly more positively in instances of higher severity (Column 2, significant difference, 𝑝 = 0.006).

Overall, these results provide strong indications that the COVID-19 crisis severity affects the stock market reaction to different response announcements.

5. Towards an understanding of crisis responses

In our exploratory analysis, we identify how firms responded to the COVID-19 crisis. We further show how investors evaluate these responses, based on their type, scope, angle, and contingent on the severity of the COVID-19 crisis for the respective firm. After identifying firms’ crisis responses and assessing the associated stock market reactions, we now engage in abductive reasoning to develop plausible explanations for our exploratory findings (Bamberger, 2018; Robinson, 2019). Building on the related crisis management and general management literature and drawing on different theoretical lenses to explain our findings (e.g., dynamic capabilities, information processing, resource dependency), we provide theory-based interpretations of our discoveries, contributing to the extant literature on crisis (response) management and stimulating future research.

Within the interdisciplinary crisis management literature, our findings broaden the body of knowledge on tactical crisis responses, which are an important yet largely overlooked element of a firm’s crisis management (Bansal et al., 2015; DesJardine et al., 2019). Specifically, following an exploratory approach, we show how firms tactically responded to the COVID-19 pandemic, a novel and unprecedented empirical setting of a global high-impact crisis. Our findings related to the positive investor evaluation of different response types, scopes, and angles add empirical insights to the question on the financial implications of crisis responses (Bansal et al., 2015; DesJardine et al., 2019; Raithel & Hock, 2021), and resonate well with research on crisis mitigation (e.g., Bundy et al., 2017) and disruption management (e.g., Bode et al., 2011).
Beyond the crisis response management literature, our study also adds to the quickly emerging literature on the COVID-19 crisis (e.g., Ali et al., 2022; Ketchen & Craighead, 2020; Verma & Gustafsson, 2020; Wenzel et al., 2020; Zattoni & Pugliese, 2021). While a majority of prior management research is of conceptual nature (e.g., Ahlstrom & Wang, 2021; Wang et al., 2020; Wenzel et al., 2020; Zattoni & Pugliese, 2021), we are among the first to present empirical insights on the types and financial implications of firm responses to the COVID-19 crisis. Identifying and assessing how firms tactically responded to the COVID-19 crisis may enhance our understanding of how to mitigate the negative consequences of the pandemic and future global high-impact crises.

5.1. Tactical crisis responses

Crisis often emerge from associated severe events, characterized by high levels of disruption and uncertainty. Global high-impact crises can substantially change the market conditions, in which a firm operates. This presents a rapidly changing and mostly harmful environment for firms, which is largely perceived negatively (Bundy & Pfarrer, 2015). Hence, it is critical to have the capabilities to adequately respond to such shifts in the environment (Ali et al., 2022; Helfat & Martin, 2015; Teece, Pisano, & Shuen, 1997). Adaptation is key to cope with the new environment, ultimately ensuring firm survival. Crisis responses realize this adaptation process (Vergne & Depeyre, 2016).

We believe that a managerial dynamic capabilities perspective (Adner & Helfat, 2003; Teece et al., 1997) provides an adequate lens to explain the role of tactical responses in crisis management. According to Teece et al. (1997), dynamic capabilities are defined as “the firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments” (p. 516). To ensure firm survival and sustain competitive advantage, firms need these dynamic capabilities to quickly reconfigure competences, realigning their resources with these new conditions (Adner & Helfat, 2003; Teece et al., 1997; Vergne & Depeyre, 2016). Thus, dynamic capabilities are often referred to as higher-level capabilities (Ambrosini, Bowman, & Collier, 2009; Barreto, 2010; Eisenhardt & Martin, 2000). In high-uncertainty environments, dynamic capabilities are associated with superior firm performance (e.g., Zahra, Sapienza, & Davidsson, 2006). Several studies specifically explore the role of dynamic capabilities during firm crises. Makkonen, Pohjola, Ollikonen, and Koponen (2014), for instance, examine how dynamic capabilities affect firm performance during the global financial crisis of 2008. They highlight that it is important to understand how firms can utilize and deploy dynamic capabilities. Our study adds to the literature by introducing tactical responses as a realization of dynamic capabilities.

Tactical responses are granular ad-hoc actions to strengthen stability at the onset of a crisis (Bansal et al., 2015; DesJardine et al., 2019). Helfat and Martin (2015) specifically stress the need for dynamic capabilities in individual managers for sensing, seizing, and re-configuration of resources as a response to high-uncertainty environments. These managerial dynamic capabilities foster the implementation of quick tactical responses (Adner & Helfat, 2003; Helfat & Martin, 2015). Beyond ensuring stability, tactical responses signal proactivity and business continuity. In contrast to long-term strategic responses, tactical responses may be able to quickly limit the crisis impact and reduce the associated costs for firms. Tactical responses can reduce overall cost and improve the efficiency of recovery activities (Paul, Chowdhury, Moktadir, & Lau, 2021). Going beyond the direct impact, tactical crisis responses may indicate superior dynamic capabilities (Teece et al., 1997), associated with an elevated capacity to realign competences with the new crisis environment. Consequently, investors may evaluate tactical crisis responses positively, as suggested by our results.

5.2. The crisis response type

In our exploratory analysis, we find tactical crisis responses to vary in their types. According to our results, digitalization and financial responses are the two types that investors evaluate consistently positively.

Digitalization responses. Crises are characterized by high levels of uncertainty, especially at their onset (Bundy & Pfarrer, 2015; Sharma et al., 2020; Wenzel et al., 2020). To counteract uncertainty, visibility is crucial during adverse events (Bode et al., 2011). Arguably, elevated visibility is critical as a baseline to understand the scale of the crisis and to adequately respond (Lee & Trimi, 2021). Prior studies also indicate that firms leverage visibility to facilitate responsiveness to shifts in their business environment, as a means to cope with uncertainty (Srinivasan & Swink, 2018; Williams, Roh, Tokar, & Swink, 2013).

An organizational information processing perspective (Galbraith, 1973; Tushman & Nadler, 1978) may provide a lens to better understand the underlying mechanisms. Information processing theory suggests that elevated environmental uncertainty creates a necessity for more information (Galbraith, 1973). Accordingly, firms try to align information processing needs and information processing capabilities (Bode et al., 2011; Tushman & Nadler, 1978). While information processing needs are high during crisis events, firms will need to strengthen their information processing capabilities to create visibility and thus reduce environmental uncertainty.

Digital technologies, such as artificial intelligence-based analytics, hold the potential to substantially facilitate information processing and visibility, with regard to inventory management, forecasting, or risk assessment (Lee & Trimi, 2021; Leonardi, 2021; Srinivasan & Swink, 2018). Likewise, blockchain is gaining increasing attention as a digital infrastructure for decentralized platforms, frequently associated with inter-organizational visibility potentials (Klöckner et al., 2022; Schmidt, Klöckner, & Wagner, 2021).

In addition, digital technologies may enhance organizational flexibility, which is an important complementary capability for firms operating under environmental uncertainty (Srinivasan & Swink, 2018). This flexibility can be an important advantage when firms adapt to the new crisis environment, further strengthening the firm’s dynamic capabilities (Teece et al., 1997; Vergne & Depeyre, 2016). During the COVID-19 crisis, for instance, firms were forced to quickly adapt to new working styles, as mobility and gatherings of people were restricted (Leonardi, 2021). Digital tools, such as videoconferencing or data sharing and editing, enabled firms to promptly set up remote working arrangements (Leonardi, 2021).

Financial responses. Firms strive for stability in their internal operations and external environment. In response to external shocks and during an ensuing crisis, firms can respond by buffering and by bridging (Bode et al., 2011; Manhart, Summers, & Blackhurst, 2020; Mammar & Nigh, 1995). Bridging responses are boundary-spanning activities with external partners and include, for example, investments in collaborative relationships. Conversely, buffering responses focus on internal safeguarding mechanisms to shield the firm from external shocks (Bode et al., 2011). For example, slack resources, such as increased inventories, redundant sourcing, or financial assets, may serve as shock absorbers (Bode et al., 2011).

Financial responses aim at expanding such slack resources that can serve as buffers during crises, and hence facilitate financial resilience (Mouzas & Bauer, 2022). Fostering financial resilience is specifically crucial during adverse events like the COVID-19 crisis (Mouzas & Bauer, 2022). According to our exploratory findings, financial responses focus on increasing liquidity, which is crucial during any crisis, as it largely determines whether a firm is able to meet its obligations and maintain operations (Chen, Yang, & Yeh, 2017). Specific financial measures may include additional debt financing, investment suspensions, or share splits and repurchase programs. We view such
responses as buffering strategies that create stability in a crisis environment (Bode et al., 2011). For instance, short-term capital intakes can increase liquidity, and thus maintain essential business operations during the crisis. Investment suspensions or postponements may further support short-term liquidity by reducing expenses. Another example are stock market-related measures like share splits or repurchase programs, targeting either an increase of tradeability or equity, both facilitating liquidity. Consistent with these mechanisms, we argue that such responses can function as a critical buffer during a crisis, facilitating financial resilience and ensuring a firm’s survival (Manhart et al., 2020; Mouzas & Bauer, 2022). Collectively, this may explain the positive investor sentiment.

5.3. The crisis response scope

Firm responses to crises can exhibit different scopes, ranging from solo efforts to engaging in collaborative alliances. According to our exploratory results, collaborative responses are evaluated consistently positively by investors. From a theoretical perspective, collaborative responses relate to the concept of bridging (Bode et al., 2011). To better understand the underlying mechanisms, we also draw from resource dependence theory (Bode et al., 2011).

The resource dependence theory, first introduced by Pfeffer and Salancik (1978), can provide a useful lens to study collaborative crisis responses. The general idea of the resource dependence theory is that firms operate within a set of dependencies, mainly created by their need to secure scarce resources from external partners (Pfeffer & Salancik, 1978). The theory emphasizes that this need for resources creates a dependency on these external partners (Pfeffer, 1981). While securing external resources is crucial and advantageous, associated dependencies may not be beneficial for the firm. The corresponding reliance on external sources often creates unilateral dependency, leaving the firm in relatively disadvantageous bargaining positions (Mouzas, 2022).

Accordingly, it is imperative that firm engage in responses that reduce these risks and uncertainties in their environment.

Diversified bridging responses aim to engage and control the firm’s environment, reducing the environment’s influence over the firm, an important objective according to the resource dependence theory (Bode et al., 2011; Hillman, Withers, & Collins, 2009). Specifically, organizations engage in collaborative alliances to mitigate uncertainty and create stability (Schilling, 2015). The resulting close collaboration strengthens relationships and builds higher levels of trust and long-term commitment (Lumineau, 2017; Wagner, Eggert, & Lindemann, 2010). In the context of crisis responses, collaborative responses can mitigate damage differently.

Collaborative alliances provide firms access to different resources and capabilities, with the potential to leverage complementary resources (Rotthiermel, 2001). Literature on knowledge management and organizational learning also suggests that recombining knowledge from different sources generates new knowledge, more than firms could have done on their own (Grant & Baden-Fuller, 2004).

Collaboration in response to a crisis also exhibits a risk sharing aspect, potentially reducing total cost (Van Der Vegt, Essens, Wahlström, & George, 2015). Close relationships might also influence business partners to prioritize scarce resource allocation in favor of their long-term partners, potentially reducing negative crisis effects. In addition, alliances aid sense-making activities, as combining knowledge between firms enables them to understand the events unfolding (Pfeffer & Salancik, 1978). A thorough understanding of the events associated with a crisis is a fundamental prerequisite for targeted responses. Finally, engaging in alliances in response to a crisis may also build organizational reputation, trust, and legitimacy (Coombs, 2007; Pfarrer, Decelles, Smith, & Taylor, 2008). All of these expected benefits of collaboration offer reasons why investors may interpret collaborative responses to crises to be worthwhile.

5.4. The crisis response angle

Crises inherently create both uncertainty-driven risks and opportunities (Sharma et al., 2020). Consequently, firm responses can primarily aim to either mitigate downside risk or to leverage upside potential (Wenzel et al., 2020). On the one hand, crisis responses that mitigate downside risk focus on alleviating adverse effects by reducing uncertainty, and creating stability (Schilling, 2015). On the other hand, crises present opportunities for learning and can initiate organizational renewal (Chakrabarti, 2015). In line with our results, literature suggests that responses focusing on downside risk mitigation are effective, especially in highly uncertain circumstances (Stieglitz, Knudsen, & Becker, 2016; Wenzel et al., 2020).

We measure the effects of firm responses on stock market performance. In the financial literature, the nature of individual and institutional investors’ risk preferences has long been a topic of debate (Xie, Hwang, & Pantelous, 2018). Loss aversion is a prominent assumption for investor behavior (Dorn & Huberman, 2010). Literature also indicates that there might be an overreaction to negative news (Capelle-Blancard & Petit, 2019). In context of an ensuing crisis, loss aversion is a likely explanation for our finding that investors prize initial mitigation of negative consequences over leveraging long-term potential.

Moreover, Raithel and Hock (2021) examine the extent that crisis responses match stakeholder expectations and find that over-conformity (i.e., response exceeds expectations) can lead to lower stock returns relative to conforming strategies. Implementing responses to leverage long-term potentials during the early stages of a crisis might thus exceed stakeholder expectations, which are likely more focused on the mitigation of negative impacts.

5.5. The role of crisis severity

Prior research on crisis management and adverse events suggests that crisis responses depend on specific situational factors (Bode et al., 2011; Bundy & Pfarrer, 2015).

For example, Bode et al. (2011) demonstrate that the severity of the supply chain disruption impact shapes the firm’s response. More generally, the authors argue that the magnitude of an adverse event elevates the urgency of action, driving firms to reexamine existing behaviors and structures to maintain stability (Bode et al., 2011; Zakay, Ellis, & Shevalsky, 2004). Other studies, building on situational crisis communication theory (Coombs, 2007), argue that crisis severity is a crucial situational factor, affecting the perceived responsibility of firms that may translate into response activity (Bundy & Pfarrer, 2015; Coombs, 2007). Extending this literature stream, Raithel and Hock (2021) recently demonstrate that investors evaluate crisis responses differently, based on situational stakeholder expectations.

Our exploratory findings support these arguments, as we find crisis severity to be an important situational factor for the stock market-based evaluation of crisis responses. Several follow-up analyses further suggest that the crisis severity also affects the financial implications associated with different response types, scopes, and angles. For example, responses aimed at leveraging upside potential seem to be more rewarding for firms that have been less severely affected by the crisis.

6. Conclusion

The purpose of this research is to extend the body of knowledge on crisis response management, based on the empirical setting of the COVID-19 pandemic, a global crisis that affects firms around the world. We explore how firms respond to the COVID-19 crisis, and what the financial implications of these responses are. We approach the question on the financial implications by conducting an event study, measuring the short-term value that investors attribute to the announced responses. We discuss and explain our exploratory findings considering multiple theoretical lenses, potentially providing a starting point for theorizing and deductive studies (Bamberger, 2018).
towards communication over silence. Crises are severe. Crisis severity seems to heighten the sensitivity of firms to broad stakeholder audiences because of lost propriety or because of the negative impacts of the crisis. Management commitment, but, more importantly, foster firm adaptability. This yields a number of implications for practitioners. First, firms need to lay the foundation by building up dynamic capabilities that can activate and shape the necessary tactical responses in crisis environments. In particular, firms need to cultivate relational capabilities (e.g., build trust with potential collaboration partners), enabling them to engage in collaborative (bridging) responses to crises. Accordingly, based on our results regarding the response scope, we encourage managers to join forces with other organizations. During global high-impact crises like the COVID-19 pandemic, it appears worthwhile to collaborate, opening possibilities for more flexible production scaling, joint research or product development, risk-sharing, and asset-sharing. Inter-organizational alliances may further provide firms with complementary resources, which can be helpful during crises.

Second, we encourage managers to clearly communicate their active responses to global high-impact crises, as our empirical findings suggest that response announcements are generally associated with positive firm value effects. Crisis responses may not only signal effective crisis management commitment, but, more importantly, foster firm adaptation to the rapidly changing crisis environment in ways that mitigate the negative impacts of the crisis.

Third, addressing the question on how to functionally respond to global high-impact crises, financial responses seem attractive to increase short-term liquidity, which can be essential during a crisis. As we also find digitalization responses to be associated with a consistently positive increase in firm value; we emphasize the potential of digital technologies to support visibility and operational efficiency, both crucial for crisis impact mitigation.

Fourth, aligned with our findings on the response angle, it seems reasonable to clearly communicate an initial focus on risk mitigation responses. Investors may value actions that limit loss and create stability before making attempts to leverage upside potential.

Finally, if managers are hesitant to communicate response actions to broad stakeholder audiences because of lost propriety or because of uncertainty about the market’s reception, they should consider our finding that such communications tend to create greater value when crises are severe. Crisis severity seems to heighten the sensitivity of the market to firm’s response announcements, thus tipping the balance towards communication over silence.

6.1. Practical implications

Our exploratory study on the firm responses to the COVID-19 crisis yields a number of implications for practitioners. First, firms need to lay the foundation by building up dynamic capabilities that can activate and shape the necessary tactical responses in crisis environments. In particular, firms need to cultivate relational capabilities (e.g., build trust with potential collaboration partners), enabling them to engage in collaborative (bridging) responses to crises. Accordingly, based on our results regarding the response scope, we encourage managers to join forces with other organizations. During global high-impact crises like the COVID-19 pandemic, it appears worthwhile to collaborate, opening possibilities for more flexible production scaling, joint research or product development, risk-sharing, and asset-sharing. Inter-organizational alliances may further provide firms with complementary resources, which can be helpful during crises.

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6.2. Limitations and future research

As any study, our research has limitations. First, and most importantly, our time horizon is a short-term assessment of COVID-19 response announcements. By measuring the stock market reaction, we capture the short-term change in firm value that investors attribute to the announced COVID-19 responses. While we believe this to be an appropriate first assessment of the financial implications, future work should examine implications in the medium- and long-term. Relatedly, firm value is not bottom line performance. Our approach allows us to capture the stock market implications of the responses. However, market performance may not be closely associated to operating performance in the short term. Accordingly, we suggest future research to also examine alternative firm performance metrics.

Second, we use the S&P 500 index as a sampling frame to collect announcements of COVID-19 responses. The constituents of this index are large, publicly traded U.S. firms. However, due to a different level of regulatory requirements, private firms might have other scopes of action available for the formulation of crisis responses. We encourage future research on the consequences of, and the responses to, global high-impact crises to examine alternative settings, considering private and small or medium-sized firms.

Beyond limitation-induced future research opportunities, we also suggest that future research should assess our exploratory findings in different crisis settings. Deductive research designs may be appropriate to do so Bamberger (2018). Furthermore, determined by the recency of our sampling approach during the early phase of the pandemic, we focus on tactical crisis responses. Not limited to the empirical setting of the COVID-19 crisis, we believe it to be worthwhile to also examine strategic responses, further widening our understanding on the types and implications of responses (Ahlstrom & Wang, 2021; Wenzel et al., 2020). Finally, we also encourage researchers to further evaluate the sustained impact of different crisis responses. Situational factors, not limited to the crisis severity, may be particularly relevant in this regard (Bundy & Pfarrer, 2015; Coombs, 2007). Arguably, the implications of different responses depend on such situational factors (Raithel & Hch, 2021).

CRediT authorship contribution statement

Maximilian Klöckner: Writing – review & editing, Writing – original draft, Software, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. Christoph G. Schmidt: Writing – review & editing, Validation, Supervision, Methodology, Investigation, Conceptualization. Stephan M. Wagner: Writing – review & editing, Validation, Supervision, Project administration, Conceptualization. Morgan Swink: Writing – review & editing, Validation, Supervision, Project administration, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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We would like to thank Peter J. Resch for supporting this study during the data collection process.

Table A.1
Measurement details for explanatory matching variables.

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<th>Description</th>
<th>Data source</th>
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<td>Logarithm of total assets (fiscal year 2019)</td>
<td>Thomson Reuters</td>
<td>Klöckner et al. (2022)</td>
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<tr>
<td>Leverage (LEVERAGE)</td>
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<td>Ratio of net income to total assets (fiscal year 2019)</td>
<td>Thomson Reuters</td>
<td>Clarke et al. (2021)</td>
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<td>Dummy variables for two-digit GICS codes</td>
<td>Thomson Reuters</td>
<td>Lo et al. (2018)</td>
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Table A.2
Cross-sectional logit regression results.

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<th>z</th>
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<td>17.43</td>
<td>0.000</td>
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<td>Ratio of stock closing price to book value per share (fiscal year 2019)</td>
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<td>0.00</td>
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</tr>
<tr>
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<td>0.03</td>
<td>0.41</td>
<td>0.679</td>
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<td>Return on assets (ROA)</td>
<td>Ratio of net income to total assets (fiscal year 2019)</td>
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<td>Included</td>
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|R2 (p-value) | 0.63322*** <0.000 |
| Log-likelihood | −434.56 |
| N | 3683 |

*p < 0.10, **p < 0.05, ***p < 0.01, ****p < 0.001.
Appendix

See Tables A1–A3.

References


Research, as well as operations management journals, such as Journal of Operations Management, Decision Sciences, Journal of Supply Chain Management, or Journal of Business Logistics.

Morgan Swink is the Eunice and James L. West Chaired Professor of Supply Chain Management at Neeley School of Business, Texas Christian University. He teaches and leads research in areas of supply chain management, innovation management, project management, and operations strategy.

Dr. Swink’s current research projects address digital transformation, innovation management, servitization, visibility, collaborative integration, and financial impacts of supply management policies. He has co-authored two supply chain operations textbooks, one managerial book on supply chain excellence, and published more than 90 articles in a variety of academic and managerial journals.