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Corporate Resilience and Response to COVID-19

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The coronavirus pandemic of 2020 took the world by storm, disrupting economies everywhere. During the first quarter of 2020, countries struggled to keep up with the rapid spread and economic impact of the coronavirus. A month after the World Health Organization (WHO) fielded the first reports of pneumonia from an unknown cause in China, the coronavirus (now referred to as COVID-19) was declared a public health emergency by the end of January 2020, with 9,826 confirmed cases in 19 countries. By February 19, the WHO reported 2,009 deaths, 75,204 confirmed cases in 25 countries,[1] and a startling 1,872 new cases from the previous day.[2]

To limit the spread of COVID-19, many governments mandated social distancing and instituted severe travel restrictions, including quarantines. This had an immediate impact on the labor force, supply chains, and sales of products and services. After the S&P 500 reached record highs on February 19, it experienced its largest one-week declines since the 2008 financial crisis.[3]

In the study described in these pages, we looked at the association between corporate responses we see as plausibly important during this crisis—specifically, those related to labor practices, supply chain, and repurposing of operations (products and services)—to determine the extent to which companies with more positive media sentiment around their responses to the crisis experienced less negative returns during the market collapse. We defined the analysis period as from February 20 (the day after the S&P 500 reached a "local" high) to the market low on March 23, during which the S&P 500 experienced a nearly 30% drop.[4] Given the impact on supply chains and labor, we focused on these characteristics as likely drivers of stock returns during this period, as well as possible corporate responses to COVID-19 in the form of changes in operations, including the repurposing of products and services.

As our measures of corporate responsiveness to the crisis, we used big data from natural language processing that detect the relative strength of positive and negative public sentiment about those corporate responses.[5] Our working hypothesis was that companies with more positive public sentiment about their responses to the pandemic and their effects on employees, suppliers, and customers would be valued more highly by stock market investors than their less favorably viewed corporate counterparts during the market collapse. One interpretation of such a finding is its confirmation of investors' tendency to view a company's commitment to its stakeholders—notably, its customers, suppliers, and employees—as a strategic resource that is expected to provide a competitive advantage.[6] But such a commitment is likely to generate

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1 "Novel Coronavirus (2019-nCoV) Situation Report – 11," World Health Organization. January 31, 2020.

2 "Coronavirus disease 2019 (COVID-19) Situation Report – 20," World Health Organization. February 19, 2020.

3 We acknowledge that at the time of this paper, the coronavirus has not yet been contained globally and markets are still in flux. Nevertheless, we scoped our study to shed light on an active and evolving crisis.

4 Major international market indices also collapsed during the same period. For example, the FTSE 100 declined by 33%, the DAX Performance Index by 34%, the Hang Seng index by 22% and the TOPIX by 26%.

5 See George Serafeim, 2020, "Public Sentiment and the Price of Corporate Sustainability," *Financial Analysts Journal* 76 (2): 26-46.

6 See R. Edward Freeman, 2010, *Strategic Management: A Stakeholder Ap-*

strategic resources only to the extent it is deemed credible, leading to higher levels of trust and stronger relationships with those stakeholders.[7] The COVID-19 crisis represents a setting in which a company's stakeholder response is more likely to be perceived as a credible commitment than "cheap talk" since it comes at a time when the world economy is experiencing a severe contraction, making such a commitment especially costly.[8] And the fact that most of the companies in our sample ended up with negative sentiment scores suggests that investors exercised considerable skepticism and such commitments were not easy to "fake."

Empirically, our setting does not provide a natural experiment that would allow us to attribute causality to our results. A competing alternative explanation is that our corporate response measures reflect how the COVID-19 crisis affects a company's business, with more positive sentiment being associated with more positive business effects from COVID-19, and negative sentiment reflecting reduced economic prospects. We attempted to limit the probability that this alternative explanation might generate our results through our research design. We estimated all relations within the 69 GICS industries, since different industries have different exposures and effects from COVID-19, and included results that control for some 158 industry and sub-industry effects. In addition, we controlled for revisions in analyst EPS forecasts during the crisis period, which we viewed as proxies for the expected short-term effects from COVID-19 on the company. What's more, we used a sentiment-based measure that was constructed using the exact same process as the other sentiment measures, with the key difference that it used keywords reflecting the company's economic prospects rather than its stakeholder response. We also complemented and confirmed our results, implementing a matched sample analysis, while controlling for other factors that might affect a company's crisis stock returns, such as firm size, profitability (ROE), dividend yield, valuation ratios, liquidity, institutional money holdings and flows, momentum, and leverage. In addition, we showed that our results were robust when using controls for a measure of a company's innovation capacity and intangible assets as well as ESG ratings that reflect the firm's policies, principles, and disclosures on ESG issues. Finally, we introduced a series of firm, industry, and country control variables that were expected to contribute to the relation between corporate responses and stock returns, further increasing our confidence that the relationship we document was not driven by an omitted variable expected to be correlated with a company's vulnerability to COVID-19.

As summarized in the pages that follow, our findings provide clear evidence of notable differences among corporate stakeholder responses to the COVID-19 crisis, and of the stock market's positive reaction to those responses that were expected to be effective both in reinforcing stakeholder relationships and in increasing long-run efficiency and value. We view such evidence as contributing to the growing literature on stakeholder management and corporate social responsibility,[9] and to studies of the redeployment of strategic resources following changes in the external environment.[10] In addition, our finding that organizations committing to their stakeholder relations during a crisis are perceived as more resilient provides evidence in support of an increasingly popular concept of organizational adaptability—namely, the capacity to adjust responses to changing external drivers—and thereby connect to the literature on dynamic capabilities[11] and organizational routines.[12]

Background, Motivation and Relevant Literature

The spread of COVID-19 and the associated health and economic pain saw governments take unprecedented measures to stabilize the economy. At the same time, corporate practices and efforts came into the spotlight. Significant emphasis was placed on labor practices, such as paid sick leave, layoffs, or hiring of workers in large corporate employers such as Walmart, Home Depot, and UPS. Another prominent response was the repurposing of corporate operations and skills to create much needed products such as masks and ventilators by companies like General Motors, Ford, GE, and 3M.

proach, Cambridge University Press.

7 See Robert Gibbons and Rebecca Henderson, "Relational Contracts and Organizational Capabilities," *Organization Science*, Volume 23, Issue 5, September-October 2012, pp. 1213-1522; and Rebecca Henderson, "Innovation in the 21st Century: Architectural Change, Purpose, and the Challenges of Our Time," *Management Science*, 2020.

8 See Jan W. Rivkin, 2000, "Imitation of Complex Strategies," *Management Science*, 46(6), pp. 824-844; and Rebecca Henderson and Eric Van den Steen, "Why Do Firms Have 'Purpose'? The Firm's Role as a Carrier of Identity and Reputation," *American Economic Review*, Vol. 105, No. 5, May 2015, pp. 326-330.

9 See Freeman (2010); Robert G. Eccles, Ioannis Ioannou, and George Serafeim, "The Impact of Corporate Sustainability on Organizational Processes and Performance," *Management Science*, Volume 60, Issue 11, pp. 2835-2857, February 2014; and Colin Mayer, 2013, *Firm commitment: Why the corporation is failing us and how to restore trust in it*. OUP Oxford; and Henderson (2020).

10 See Laurence Capron, Pierre Dussauge, and Will Mitchell, 1998, "Resource Redeployment Following Horizontal Acquisitions in Europe and North America," 1988-1992. *Strategic Management Journal*, 19(7), pp. 631-661; and Marvin B. Lieberman, Gwendolyn K. Lee, Timothy B. Folta, 2017 "Entry, Exit, and the Potential for Resource Redeployment," Strategic Management Journal, 38(3), pp. 526-544.

11 See Christian Stadler, Constance E. Helfat and Gianmario Verona, 2013, "The Impact of Dynamic Capabilities on Resource Access and Development," *Organization Science*, 24(6), pp.1782-1804; and Tang Wang, Vikas A. Aggarwal, and Brian Wu, "Capability Interactions and Adaptation to Demand-Side Change," *Strategic Management Journal*, Forthcoming.

12 See Martha S. Feldman, 2000, "Organizational Routines as a Source of Continuous Change," *Organization Science*, 11(6), pp. 611-629; and Constance E. Helfat, and Samina Karim, 2014, "Fit Between Organization Design and Organizational Routines," *Journal of Organization Design*, 3(2).

A third focus of intense scrutiny was the exposure of global supply chains that were disrupted as economies were closing down and workers were at risk of getting infected due to a lack of protective equipment and appropriate distancing policies, leading to production halts and shortages.[13]

The main hypothesis of our study was that companies making significant and credible commitments to their stakeholder relations during the COVID-19 crisis provided signals of resilience to investors, leading to less negative stock returns during the market collapse. Resilience is a concept that is not only applicable in a business setting, but a much-discussed concept in the health, psychology, and infrastructure literatures as well. Consistent with one definition as "the capacity to recover quickly from difficulties," resilience at the most basic level is the ability to withstand the effects of a negative event. In this sense, resilience is related to the literature on dynamic capabilities and organizational routines and, more specifically, to the ability of organizations to adapt to changes in the external environment.

Of course, not all corporate responses are likely to be important in the context of COVID-19. As just noted, employment and supply chain practices are likely to be focal areas. In addition, the ways that companies find to reposition their operations to provide products and services to customers will likely be important considerations. Collectively, those three responses can be viewed as shaping a company's commitment to its relationships with three key stakeholders: employees, suppliers, and customers.

Stakeholder management theory suggests that better stakeholder relations could translate into better corporate business outcomes as these relations become strategic resources.[14] For example, companies that succeed in building and sustaining relational contracts with their employees could experience improved employee engagement and productivity.[15] However, to achieve stakeholder relations strong enough to be viewed as strategic resources capable of improving business outcomes, companies must make credible commitments.[16] And such credibility comes from making investments to the relationship when such investments might be more costly for an organization, such as during a market collapse.[17] In this way, the COVID-19 crisis represents a setting that allows us to observe differential corporate responses and link those to stock returns.

Avoiding lay-offs, providing flexible work schedules, and offering paid sick leave could all allow companies to be more resilient in the face of adversity, helping them maintain high employee productivity while mitigating costs by avoiding employee churn.[18] Similarly, companies committed to their supply chain relations might be able to respond more quickly by adapting their supply chain to avoid costly production halts and secure the supply of important materials.[19] Finally, companies that divert their operations to provide needed products and services thereby demonstrate a degree of customer focus that could forge stronger customer and brand loyalty. For all the above reasons, we expect companies that exhibit more positive sentiment around their human capital, supply chain, and operational crisis response (in-demand products and services) might earn investor confidence and experience less negative returns during the crisis.[20]

Nevertheless, there is an underlying tension built into this hypothesis. Because companies in time of crisis significantly cut investments to their stakeholders,[21] investors may well view responses that harm stakeholders as necessary for corporate survival, and the absence of such measures as detrimental to the long-term success of the organization in a competitive market. To the extent this is so, companies with more positive sentiment around their response might actually be expected to experience more negative returns.

Data and Sample

We used a combination of multiple datasets to understand drivers of stock returns during the COVID-19 crisis. (See the Appendix for precise definitions of variables.)

Corporate Response Data

In assessing media sentiment toward companies, we used Truvalue Labs environmental, social, and governance (ESG) data, which applies machine learning and natural language processing in eleven languages to thousands of news sources, such as traditional media, blogs, and industry publications. Truvalue Labs (hereafter "Truevalue") sources big data from a series of vetted outlets to improve the credibility and accuracy of processed information. Moreover, Truvalue has avoided the approach of relying on corporate self-reported data to evaluate companies. Instead, they assess how society at large perceives

13 Just Capital has been tracking corporate responses of the largest corporate employers here: https://justcapital.com/reports/the-covid-19-corporate-response-tracker-how-americas-largest-employers-are-treating-stakeholders-amid-the-coronavirus-crisis/.

14 Freeman (2010).

15 Gibbons and Henderson (2012) and Henderson and Van den Steen (2015).

16 Gibbons and Henderson (2012) and Mayer (2013).

17 Henderson and Van den Steen (2015) and Henderson (2020).

18 Eccles, Ioannou, and Serafeim (2014).

19 Freeman (2010).

20 Karl V. Lins, Henri Servaes, and Ane Tamayo, 2017, "Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis," *The Journal of Finance*, 72(4), pp. 1785-1824.

21 Flammer and Ioannou (2018).

and is affected by corporate behavior by gathering data from over 100,000 data sources.[22]

For the purposes of this study, we focused on the sentiment scores that specifically identified when COVID-19 was being discussed in relation to companies within unstructured text.[23] Truvalue scores how positive or negative the COVID-19 content tone is within each article and provides sentiment measures for each week starting in January 2020. For example, news stories that mention layoffs or absence of paid sick leave are usually accompanied by negative commentary and thereby receive negative sentiment scores. In contrast, news that pertains to avoiding layoffs or keeping workers safe tends to receive positive commentary and thereby receives positive sentiment scores.[24] Because of the lack of relevant data in the first few weeks, we used data for the period between February 12 and March 24, when COVID-19 became an important topic of conversation. We constructed a firm-level measure over the period of study by calculating separately the median value of Human Capital, Supply Chain, and Products and Services sentiment for a given firm across the six weeks.[25]

For an example involving Human Capital, one article cited Emirates Group's enforcing of a temporary 25% to 50% reduction in base salary for the majority of its employees as well as required unpaid leave for its staff.[26] The company's Human Capital response in this article was evaluated and recorded as -1.95. We observed a positive example of a company's Human Capital response in an article reporting Husky Energy's announcement to keep employees and construction sites safe, where staff are working remotely and non-essential employees are asked to stay home.[27] The company's statement spoke to protecting employees, and Truvalue captured this positive sentiment with a score of 1.25.

Moving on to a company's response to changes in Products and Services, during our study period, one article discussed Amazon's failure to respond effectively to the high demand for masks, as the global public began wearing masks daily.[28] The company's Products and Services response in this article was captured as -2.22. A positive example of a company's Products and Services response during this period was provided in an article quoting 3M's announcement of a shipment of N95 masks to high-risk cities in the U.S. and outlined the increase production of masks to an annual rate of two billion worldwide.[29] Truvalue assigned this positive sentiment a score of 1.45.

In addition, we used as a control variable a sentiment measure that we called "Economy" that served as a proxy for the COVID-19's effect on the economic prospects of a company during this crisis period. For an example of a negative trend linked to a company during our study period, one article cited Lyft's link to social distancing as initiating a countertrend against ride-sharing.[30] The tone of the section is negative, since Lyft and its ride-sharing competitors were grappling with new norms from social distancing. The company's Economy score in this article was captured as -2.35. We observed a positive example of a company's Economy in an article mentioning FedEx's anticipation of a positive earnings effect since the company serves a growing population of people living and working at home, ordering online and shipping packages.[31] Along with stock analysts' statements projecting earnings increases, FedEx's statements were scored by Truvalue as positive sentiments with a value of 4.59.

We used stock prices, security features, and (free-float) market capitalizations from the MSCI's ACWI IMI universe, and classified industries and sub-industries in line with the Global Industry Classification Standard (GICS). Returns are calculated in USD.

Our sample covered global listed equities with a market capitalization of at least $1 billion as of January 1, 2020, and included the intersection of the datasets provided by Truvalue Labs, MSCI, and State Street Corporation. We used lagged 20-day cumulative flows,[32] lagged 20-day cumulative returns, and lagged holdings before and including February 19, 2020 to study the period from February 20, 2020 through March 23, 2020.

The 3,023 companies in our sample, as reported in Table 1, had an average market cap of $18.9 billion (on February 19), as well as an average ROE of 13.7%, price-to-earnings of 17.7, book-to-market of 0.62, and dividend yield of 2.5%. Our 3,000 plus companies represented some $57 trillion in

22 For a longer discussion of the Truvalue Labs data we refer the interested reader to prior literature (Serafeim 2020).

23 For more information on Truvalue Labs COVID-19 dataset see here: https://coronavirus.truvaluelabs.com/.

24 Sentiment scores are scaled to vary from -20 to +20.

25 Truvalue Labs provides two more measures labeled Economy and Social Impact. We have not included those metrics in our analysis because they are less tightly defined and therefore it is not clear what they are measuring exactly regarding companies' responses.

26 "Germany makes two people the limit, Merkel forced into quarantine," *ABC Online*, March 22, 2020.

27 "Husky Energy suspends West White Rose Project in Newfoundland," *Cape Breton Post*, March 22, 2020.

28 "A store in Thailand repackaged and sold up to 200,000 used face masks for coronavirus, police chief says," *Business Insider*, March 10, 2020.

29 "Half a million N95 masks are on their way to New York and Seattle, manufacturer says," *Washington Post*, March 22, 2020.

30 "Lyft to offer medical supply and meal delivery during coronavirus pandemic," *Yahoo! Finance*, March 22, 2020.

31 "Insiders pull the trigger on these stocks on the cheap," *Nasdaq*, March 22, 2020.

32 State Street flow and holdings data have been anonymized and aggregated to preserve client confidentiality.

market value across 47 countries, suggesting that our analysis represents a sample representative of the global listed firm universe. All response measures had a negative average value, which reflects the generally negative tone of news coverage of these corporate responses and COVID-19.[33]

Research Design

Since our sample was global, we subtracted from each company's stock returns during the period February 20-March 23 the value-weighted return on the market index associated with the country of the firm's primary trading venue. We classified all the corporate response measures in our sample into one of three categories: Supply Chain (SC), Human Capital (HC), and Products and Services (PS). Because each of these response measures as well as the stock returns could vary systematically across industries, we included in all our models industry fixed effects using the six-digit GICS industry code.[34] Therefore, estimates were derived from within-industry, rather than across-industry, differences. Moreover, in different specifications we also included country and subindustry fixed effects.[35] Then, to see if market investors appeared to be influenced by (at least the media's view of) corporate responses to COVID-19, we used regression analysis to measure the relationship between those responses and the cumulative stock returns from the day after the market peak on February 20 through the trough on March 23.

Each ordinary least squares regression was conducted with a set of control variables that included dividend yield, earnings-to-price ratio, book-to-market, market capitalization, return on equity and leverage alongside lagged flows, lagged returns, and lagged holdings.[36] We controlled for lagged returns, institutional money holdings and flows as they have been found to correlate with future returns.[37] We expected larger, more profitable, less leveraged, and higher dividend yield stocks to have higher returns during a market collapse since investors would be likely to view them as less risky. The two valuation ratios, earnings-to-price ratio and book-to-market, were used to control for differences in the duration of cash flows on the premise that "value" firms might be expected to experience more negative returns given more of the firm value is coming from more immediate cash flows that are now being impaired due to the COVID-19 crisis. We also controlled for liquidity, measured as share turnover. More liquid stocks might experience larger price declines since they can be sold more readily to meet redemptions during a market collapse. In addition, we controlled for analyst EPS forecast revisions during the crisis, a variable that proxies for the immediate business effects of COVID-19 on different organizations. (As noted earlier, definitions of all variables can be found in the Appendix.)

At a company level, we used the average of Human Capital (HC), Supply Chain (SC), and Products and Services (PS) to create a composite "Crisis Response" measure, which is our main variable of interest in the following regression model:

$$\begin{aligned}\text{Crisis Return}_i &= \alpha + \beta_1\ \text{Crisis Response(HC+SC+PS)}_i \\ &+ \beta_2\ \text{Lagged flow}_i + \beta_3\ \text{Lagged return}_i + \beta_4\ \text{Lagged holding}_i + \beta_5\ \text{ROE}_i + \beta_6\ \text{E/P}_i + \beta_7\ \text{BTM}_i \\ &+ \beta_8\ \text{Momentum}_i + \beta_9\ \text{Dividend yield}_i + \beta_{10}\ \text{Market Cap}_i \\ &+ \beta_{11}\ \text{Leverage}_i + \beta_{12}\ \text{EPS Forecast revision}_i + \beta_{13}\ \text{Liquidity}_i \\ &+ \text{Country,Industry or Subindustry Fixed Effects} + \varepsilon_i\end{aligned}$$

As discussed above, the coefficient of interest in this model is β_1, which is a measure of the extent to which a company's crisis response (positive or negative) appears correlated with its stock market return during the market collapse.

Findings: Regression Analysis

Table 1 presents results from univariate correlations. We observe a significant positive correlation between Supply Chain and Human Capital (0.34), suggesting that companies with positive public sentiment about their supply chain responses also tended to generate positive public sentiment about their treatment of employees (paid sick leave, commitments to no or limited layoffs, etc.). Products and Services also exhibited significant positive correlations with Supply Chain (0.28) and Human Capital (0.29). These positive correlations suggest that corporate responses were generally consistent across the different themes or stakeholder groups. At the same time, the moderate correlations also suggest significant variation among corporate responses, which in turn allowed us to model all three variables simultaneously. We observed significant negative correlations between both Supply Chain and Human Capital to our

33 All variables are winsorized at 1% and 99% except market cap, dummy variables such as B2C, Routine Tasks and Stalled, as well as country-level variables including Customer and Talent. Not winsorizing stock returns produces very similar results to the tabulated results in the paper.

34 We also estimated all our models including fixed effects for the 8-digit sub-industry code. In some industries there could be significant differences across sub-industries, not only how companies respond but also perform during this crisis period. All the results were very similar, suggesting variation across sub-industry membership within industries is unlikely to explain our results.

35 Including subindustry effects leaves few firms within each subindustry for some subindustries forcing most of the estimation to be derived from a smaller number of subindustries with a large number of firms. For that reason, we report results both using industry and subindustry effects.

36 Standard errors are robust to heteroscedasticity. Clustering standard errors at the industry or country level leaves all inferences around statistical significance unchanged.

37 Kenneth A. Froot, Paul G. J. O'Connell, and Mark S. Seasholes, 2001, "The Portfolio Flows of International Investors," *Journal of Financial Economics* 123(3), 441-463.

Table 1

Summary Statistics and Correlations Across Variables

	Summary Statistics				Correlations									
Variables	**Mean**	**Std Dev**	**Min**	**Max**	**Crisis return**	**Crisis Response**	**Supply Chain**	**Human Capital**	**Products & Services**	**Economy**	**Lagged flow**	**Lagged return**	**Lagged holding**	**Market cap**
Crisis return	-0.037	0.147	-0.421	0.339	**1.00**	**0.11**	0.10	**0.09**	**0.07**	**0.14**	0.00	0.08	0.03	**0.14**
Crisis Response	-0.492	0.666	-4.548	2.055	**0.11**	**1.00**	0.75	**0.72**	**0.71**	**0.33**	0.01	0.05	0.05	**-0.23**
Supply Chain	-0.608	0.898	-3.546	1.530	**0.10**	**0.75**	1.00	**0.34**	**0.28**	**0.29**	0.00	0.02	0.02	**-0.17**
Human Capital	-0.498	0.830	-3.548	1.353	**0.09**	**0.72**	**0.34**	1.00	**0.29**	**0.24**	0.01	**0.04**	**0.04**	**-0.22**
Products & Services	-0.368	0.848	-3.584	1.617	**0.07**	**0.71**	**0.28**	**0.29**	1.00	**0.21**	0.02	0.03	**0.05**	**-0.15**
Economy	-0.230	1.079	-2.974	3.475	**0.14**	**0.33**	**0.29**	**0.24**	**0.21**	1.00	0.02	**0.09**	**0.07**	**-0.11**
Lagged flow	-0.002	0.072	-0.304	0.269	0.00	0.01	0.00	0.01	0.02	0.02	1.00	**0.10**	**0.04**	-0.02
Lagged return	-0.009	0.076	-0.210	0.231	**0.08**	**0.05**	0.02	**0.04**	0.03	**0.09**	**0.10**	1.00	**0.25**	**0.13**
Lagged holding	-0.005	0.042	-0.172	0.120	0.03	**0.05**	0.02	**0.04**	**0.05**	**0.07**	**0.04**	**0.25**	1.00	**0.05**
Market cap	22.746	1.190	20.472	27.997	**0.14**	**-0.23**	**-0.17**	**-0.22**	**-0.15**	**-0.11**	-0.02	**0.13**	**0.05**	1.00
ROE	0.137	0.168	-0.459	0.944	0.03	**-0.06**	**-0.05**	**-0.05**	**-0.04**	-0.01	-0.03	-0.04	0.01	**0.20**
E/P	0.056	0.052	-0.122	0.243	**-0.15**	**-0.06**	**-0.06**	-0.03	**-0.05**	**-0.15**	-0.01	**-0.14**	-0.02	0.00
BTM	0.616	0.557	0.027	3.055	**-0.19**	**-0.04**	**-0.05**	-0.01	-0.03	**-0.19**	0.00	**-0.14**	**-0.10**	**-0.18**
Momentum	0.138	0.277	-0.451	1.123	**0.08**	0.02	0.00	0.03	0.01	**0.12**	-0.02	**0.24**	**0.35**	**0.17**
Dividend yield	0.025	0.023	0.000	0.215	**-0.12**	**-0.08**	**-0.05**	**-0.05**	**-0.07**	**-0.11**	0.00	**-0.11**	**-0.07**	0.01
Liquidity	0.749	0.041	0.601	0.841	**-0.14**	**-0.12**	**-0.09**	**-0.11**	**-0.07**	-0.01	-0.02	-0.03	**-0.14**	**0.21**
Leverage	0.228	0.218	0.000	0.944	**-0.06**	-0.01	-0.01	-0.02	0.02	-0.01	-0.01	0.01	**0.07**	**-0.05**
Forecast revision	-0.053	0.170	-1.000	0.405	**0.20**	**0.08**	**0.08**	**0.08**	0.03	**0.09**	0.02	**0.22**	**0.17**	**0.11**
Salience	1.297	1.038	0.012	4.639	**-0.18**	**-0.42**	**-0.35**	**-0.32**	**-0.29**	**-0.23**	0.01	**-0.10**	**-0.08**	**-0.10**
Routine Tasks	0.678	0.467	0.000	1.000	**-0.05**	-0.03	0.00	-0.03	-0.02	**-0.07**	0.00	**-0.05**	-0.02	-0.02
B2C	0.461	0.499	0.000	1.000	**0.11**	**-0.07**	-0.01	**-0.08**	**-0.07**	**-0.05**	0.02	0.01	-0.03	**0.08**
Stalled	0.082	0.274	0.000	1.000	**-0.13**	**-0.09**	-0.03	**-0.07**	**-0.11**	**-0.05**	0.01	-0.03	0.02	**-0.06**
Customer	0.366	0.577	-1.075	1.534	**0.04**	**0.11**	**0.10**	**0.08**	**0.07**	**0.04**	-0.01	**-0.05**	-0.03	-0.02
Talent	0.280	0.449	-1.185	1.600	0.02	**0.07**	**0.06**	**0.04**	**0.05**	**0.05**	-0.01	0.00	0.00	-0.03

Table 1 presents the summary statistics and the univariate correlations across all variables for our sample of global equities. Variables are defined in the Appendix. Correlations in **bold** are significant at the 5% level.

Salience measure, -0.35 and -0.32 respectively, as well as with Products and Services (-0.29). This suggests that news articles that gathered more attention on the three issues generally had more negative sentiment during this period. In addition, we found crisis returns to be negatively correlated with the two valuation ratios BTM (-0.19) and E/P (-0.15), with a level of significance less than 1%, which suggests value stocks underperformed during the recent market crash, consistent with observed returns from a variety of value indices (notably, the MSCI Value vs. Growth indices, and the performance of the Fama-French HML factor).

Table 2 presents the results for country-adjusted stock returns during the crisis including in the model as explanatory variables a company's crisis response (the average of HC, SC, PS), as well as other control variables. Regardless of country, industry, or subindustry fixed effects, we observed significant and positive relationships between our Crisis Response variable and corporate stock returns in Models 1 to 4. An

Table 1
(continued)

	Correlations (continued)													
Variables	**ROE**	**E/P**	**BTM**	**Momen-tum**	**Dividend yield**	**Liquidity**	**Leverage**	**Forecast revision**	**Salience**	**Routine task**	**B2C**	**Stalled**	**Customer**	**Talent**
Crisis return	0.03	**-0.15**	**-0.19**	**0.08**	**-0.12**	**-0.14**	**-0.06**	**0.20**	**-0.18**	**-0.05**	**0.11**	**-0.13**	**0.04**	0.02
Crisis Response	**-0.06**	**-0.06**	**-0.04**	0.02	**-0.08**	**-0.12**	-0.01	**0.08**	**-0.42**	-0.03	**-0.07**	**-0.09**	**0.11**	**0.07**
Supply Chain	**-0.05**	**-0.06**	**-0.05**	0.00	**-0.05**	**-0.09**	-0.01	**0.08**	**-0.35**	0.00	-0.01	-0.03	**0.10**	**0.06**
Human Capital	**-0.05**	-0.03	-0.01	0.03	**-0.05**	**-0.11**	-0.02	**0.08**	**-0.32**	-0.03	**-0.08**	**-0.07**	**0.08**	**0.04**
Products & Serv.	**-0.04**	**-0.05**	-0.03	0.01	**-0.07**	**-0.07**	0.02	0.03	**-0.29**	-0.02	**-0.07**	**-0.11**	**0.07**	**0.05**
Economy	-0.01	**-0.15**	**-0.19**	**0.12**	**-0.11**	-0.01	-0.01	**0.09**	**-0.23**	**-0.07**	**-0.05**	**-0.05**	**0.04**	**0.05**
Lagged flow	-0.03	-0.01	0.00	-0.02	0.00	-0.02	-0.01	0.02	0.01	0.00	0.02	0.01	-0.01	-0.01
Lagged return	-0.04	**-0.14**	**-0.14**	**0.24**	**-0.11**	-0.03	0.01	**0.22**	**-0.10**	**-0.05**	0.01	-0.03	**-0.05**	0.00
Lagged holding	0.01	-0.02	**-0.10**	**0.35**	**-0.07**	**-0.14**	**0.07**	**0.17**	**-0.08**	-0.02	-0.03	0.02	-0.03	0.00
Market cap	**0.20**	0.00	**-0.18**	**0.17**	0.01	**0.21**	**-0.05**	**0.11**	**-0.10**	-0.02	**0.08**	**-0.06**	-0.02	-0.03
ROE	1.00	**0.34**	**-0.30**	**0.08**	**0.10**	-0.01	0.01	**0.10**	0.01	0.01	0.03	**0.05**	**-0.10**	**-0.08**
E/P	**0.34**	1.00	**0.43**	**-0.24**	**0.44**	**-0.14**	**0.05**	-0.02	**0.09**	**0.14**	**0.06**	-0.01	0.00	0.01
BTM	**-0.30**	**0.43**	1.00	**-0.39**	**0.30**	**-0.11**	0.03	**-0.16**	**0.15**	**0.12**	0.01	**-0.06**	**0.13**	**0.07**
Momentum	**0.08**	**-0.24**	**-0.39**	1.00	**-0.25**	0.00	-0.02	**0.23**	**-0.15**	**-0.11**	-0.03	-0.01	**-0.05**	0.00
Dividend yield	**0.10**	**0.44**	**0.30**	**-0.25**	1.00	**-0.20**	**0.07**	**-0.07**	**0.07**	**0.04**	0.01	-0.03	**-0.16**	**-0.14**
Liquidity	-0.01	**-0.14**	**-0.11**	0.00	**-0.20**	1.00	-0.02	**-0.14**	**0.12**	**-0.08**	**-0.04**	-0.02	**0.26**	**0.11**
Leverage	0.01	**0.05**	0.03	-0.02	**0.07**	-0.02	1.00	-0.02	-0.01	**-0.06**	-0.01	**0.09**	-0.03	0.00
Forecast revision	**0.10**	-0.02	**-0.16**	**0.23**	**-0.07**	**-0.14**	-0.02	1.00	**-0.17**	**-0.09**	**0.06**	**-0.09**	0.00	-0.01
Salience	0.01	**0.09**	**0.15**	**-0.15**	**0.07**	**0.12**	-0.01	**-0.17**	1.00	0.01	**0.12**	**0.22**	**-0.16**	**-0.08**
Routine Tasks	0.01	**0.14**	**0.12**	**-0.11**	**0.04**	**-0.08**	**-0.06**	**-0.09**	0.01	1.00	**0.17**	**0.08**	0.00	**0.04**
B2C	0.03	**0.06**	0.01	-0.03	0.01	**-0.04**	-0.01	**0.06**	**0.12**	**0.17**	1.00	**0.19**	**0.04**	0.00
Stalled	**0.05**	-0.01	**-0.06**	-0.01	-0.03	-0.02	**0.09**	**-0.09**	**0.22**	**0.08**	**0.19**	1.00	-0.02	-0.01
Customer	**-0.10**	0.00	**0.13**	**-0.05**	**-0.16**	**0.26**	-0.03	0.00	**-0.16**	0.00	**0.04**	-0.02	1.00	**0.63**
Talent	**-0.08**	0.01	**0.07**	0.00	**-0.14**	**0.11**	0.00	-0.01	**-0.08**	**0.04**	0.00	-0.01	**0.63**	1.00

Table 1 (continued from previous page) presents the univariate correlations across all variables. Variables are defined in the Appendix.
Correlations in **bold** are significant at the 5% level.

increase of two standard deviations in the Crisis Response measure was associated with approximately 2.2% higher stock returns for our global sample of companies.

When we introduced our Economy control variable in Models 5 and 6, the estimated coefficient on Crisis Response was somewhat lower, but still positive and significant. In Models 7-9 and 10-12 we estimated separately the relationship between Crisis Response and stock returns for our North American and global ex-North America samples. In both cases, the estimated coefficient on Crisis Response was positive and significant, and the estimated increases in stock returns were 2.7% and 1.4%, respectively. As expected, the estimated coefficients on both the Economy variable and on Forecast Revision were positive and significant. Companies that were larger, less liquid, more profitable, and categorized as growth (as opposed to value) companies all had less negative returns.

As reported in Table 3, we found significant and positive relationship between stock returns and corporate

Table 2

Regression Results for Stock Crisis Return on Corporate Crisis Response

Variables	Global						North America			Global ex North America		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Crisis Response	0.0160	0.0137	0.0156	0.0137	0.0112	0.0100	0.0222	0.0194	0.0197	0.0147	0.0099	0.0099
	3.90	3.42	3.76	3.36	2.59	2.37	3.12	2.72	2.63	3.12	2.16	2.03
Economy					0.0085	0.0072			0.0047			0.0094
					3.83	3.37			1.20			3.53
Lagged flow	-0.0252	-0.0333	-0.0220	-0.0295	-0.0224	-0.0294	-0.0039	0.0073	-0.0034	-0.0556	-0.0852	-0.0585
	-0.86	-1.19	-0.75	-1.06	-0.76	-1.05	-0.10	0.21	-0.09	-1.41	-2.26	-1.49
Lagged return	-0.0053	-0.0395	-0.0205	-0.0579	-0.0243	-0.0606	0.0230	-0.0096	0.0212	-0.0623	-0.0990	-0.0689
	-0.14	-1.08	-0.54	-1.54	-0.64	-1.62	0.37	-0.16	0.35	-1.30	-2.08	-1.43
Lagged holding	0.0076	-0.0071	0.0014	-0.0107	-0.0002	-0.0115	0.0355	0.0386	0.0348	-0.0666	0.0117	-0.0631
	0.11	-0.10	0.02	-0.16	0.00	-0.18	0.41	0.47	0.40	-0.63	0.12	-0.60
Market cap	0.0173	0.0169	0.0160	0.0161	0.0164	0.0164	0.0152	0.0119	0.0153	0.0149	0.0187	0.0156
	7.81	7.66	7.18	7.30	7.32	7.38	4.28	3.34	4.31	5.07	6.49	5.25
ROE	0.0200	0.0345	0.0367	0.0498	0.0363	0.0497	0.0543	0.0830	0.0548	0.0550	0.0460	0.0531
	0.97	1.73	1.76	2.49	1.74	2.49	1.64	2.58	1.65	1.83	1.60	1.78
E/P	-0.1048	-0.0817	-0.1309	-0.1080	-0.1245	-0.1051	-0.2547	-0.2146	-0.2542	-0.0505	-0.0492	-0.0414
	-1.34	-1.00	-1.65	-1.32	-1.56	-1.28	-1.61	-1.28	-1.60	-0.66	-0.65	-0.54
BTM	-0.0109	0.0005	-0.0218	-0.0095	-0.0207	-0.0087	-0.0143	0.0011	-0.0126	-0.0283	-0.0245	-0.0278
	-1.39	0.06	-2.55	-1.08	-2.42	-0.98	-0.58	0.05	-0.51	-3.67	-3.12	-3.61
Momentum	-0.0223	-0.0193	-0.0261	-0.0247	-0.0277	-0.0261	-0.0117	-0.0150	-0.0140	-0.0350	-0.0307	-0.0350
	-1.97	-1.77	-2.28	-2.22	-2.41	-2.34	-0.60	-0.80	-0.71	-2.52	-2.20	-2.52
Dividend yield	-0.2793	-0.2144	-0.2491	-0.2084	-0.2604	-0.2132	-0.1526	0.1027	-0.1617	-0.3391	-0.2166	-0.3375
	-2.03	-1.61	-1.71	-1.51	-1.80	-1.56	-0.56	0.36	-0.59	-2.15	-1.46	-2.15
Liquidity	-0.6200	-0.6234	-0.5952	-0.5748	-0.5906	-0.5719	-0.2254	-0.2842	-0.2397	-0.6061	-0.5694	-0.5938
	-8.72	-8.86	-6.04	-5.88	-5.99	-5.84	-1.03	-1.35	-1.09	-5.64	-5.26	-5.52
Leverage	-0.0184	-0.0142	-0.0171	-0.0130	-0.0173	-0.0133	-0.0366	-0.0187	-0.0365	-0.0061	0.0004	-0.0065
	-1.57	-1.24	-1.46	-1.13	-1.49	-1.16	-1.88	-0.99	-1.88	-0.42	0.03	-0.45
Forecast revision	0.0856	0.0755	0.0850	0.0753	0.0839	0.0752	0.0625	0.0767	0.0623	0.1044	0.0609	0.1025
	4.29	3.96	4.24	3.91	4.19	3.90	2.47	2.93	2.46	3.53	2.11	3.48
N	3023	3023	3023	3023	3023	3023	1136	1136	1136	1887	1887	1887
Adjusted R-squared	0.29	0.35	0.33	0.38	0.33	0.38	0.35	0.42	0.35	0.33	0.39	0.34
Country Fixed Effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	No	Yes	No	Yes	No	Yes	No	Yes	Yes	No	Yes
Subindustry Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No

Table 3 presents estimated coefficients and below those t-statistics. Dependent variable is the firm-level stock returns minus the country-level market returns cumulated between February 20, 2020 and March 23, 2020. All variables are defined in the Appendix.

responses to Human Capital (HC), Supply Chain (SC), and Products and Services (PS) issues during the crisis. When testing these sentiment characteristics all at once, we found HC and SC to be significant but not PS. We also found—not reported in the table—that in our global ex-North America sample, PS was significant while SC was

Table 3

Regression Results for Stock Crisis Return on Human Capital, Supply Chain, and Products & Services Responses

Variables	Model 1	Model 2	Model 3	Model 4
Human Capital	0.0098			0.0076
	3.30			2.49
Supply Chain		0.0083		0.0060
		3.06		2.18
Products & Services			0.0050	0.0020
			1.88	0.75
Lagged flow	-0.0217	-0.0200	-0.0221	-0.0214
	-0.74	-0.68	-0.76	-0.73
Lagged return	-0.0199	-0.0169	-0.0149	-0.0215
	-0.52	-0.44	-0.39	-0.56
Lagged holding	0.0065	0.0070	0.0020	0.0045
	0.10	0.10	0.03	0.07
Market cap	0.0155	0.0150	0.0145	0.0162
	6.94	6.77	6.60	7.20
ROE	0.0370	0.0380	0.0369	0.0371
	1.77	1.81	1.76	1.77
E/P	-0.1343	-0.1303	-0.1305	-0.1322
	-1.69	-1.62	-1.62	-1.66
BTM	-0.0230	-0.0223	-0.0231	-0.0219
	-2.68	-2.60	-2.68	-2.56
Momentum	-0.0273	-0.0257	-0.0261	-0.0265
	-2.37	-2.23	-2.26	-2.31
Dividend yield	-0.2480	-0.2592	-0.2475	-0.2518
	-1.69	-1.77	-1.69	-1.72
Liquidity	-0.6114	-0.6027	-0.6243	-0.5922
	-6.22	-6.11	-6.34	-6.01
Leverage	-0.0165	-0.0174	-0.0183	-0.0165
	-1.41	-1.48	-1.56	-1.41
Forecast revision	0.0855	0.0856	0.0875	0.0844
	4.25	4.24	4.32	4.21
N	3023	3023	3023	3023
Adjusted R-squared	0.33	0.33	0.33	0.33
Country Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes

Table 3 presents estimated coefficients and below those t-statistics. Dependent variable is the firm-level stock returns minus the country-level market returns cumulated between February 20, 2020 and March 23, 2020. All variables are defined in the Appendix.

not, which is consistent with potentially greater concern about supply chain issues in North America during this period. For the global sample, by contrast, the repurposing of products and services was perceived as more important than supporting supply chains.

The analysis whose findings are summarized in Table 4 attempted to control for differences in companies' innovation capacity as reflected in their accumulation of intangible assets and ESG ratings. Following the procedure of Demers et al. (2020), we calculated innovation-related assets as the accumulation of R&D investments and investments in SG&A over the past five years,[38] which have been proposed to explain stock returns during the first quarter of 2020. We also included controls for ESG ratings that some have been suggested as explaining returns during the COVID-19 induced market collapse. Because ESG ratings reflect primarily an accumulation of policies, principles, disclosures, and strategies bearing on a wide variety of ESG issues, such ratings could fail to predict how companies reacted during the crisis on issues that are likely to be of importance to stakeholders.[39]

The sample decreased by about 600 companies when we required ESG ratings and the RD&SGA variables. But even after introducing these controls, our basic findings were unchanged. The Crisis Response variable was still highly significant, and the estimated economic effect remains practically unchanged from that reported in Table 3. Perhaps the main reason for this is the low correlation we find between Crisis Response and these additional control variables. In addition, we found the R&D and intangibles variables to be significant, and also the ESG rating by MSCI. More specifically, a two-standard deviation increase in the ESG rating by MSCI was associated with about 1.2% higher stock returns, which is close to half the economic effect of a two standard deviation increase in the Corporate Response variable. (By contrast, the ESG rating from Sustainalytics was not significant.)

On the basis of these findings, then, we concluded that a company's response toward its stakeholders can be important in preserving value, even after controlling for intangible assets and ESG ratings.

38 We set R&D expenditures to zero if they are missing. We do not set SG&A expenditures to zero if missing as they are unlikely to be zero for any organization.

39 See Sakis Kotsantonis and George Serafeim, 2019, "Four things no one will tell you about ESG data," *Journal of Applied Corporate Finance*, 31(2), pp. 50-58; and Dane Christensen, Anywhere Sikochi, and George Serafeim, 2021, "Why is Corporate Virtue in the Eye of The Beholder? The Case of ESG Ratings," *Accounting Review,* forthcoming. Our analysis used MSCI and Sustainalytics ESG ratings, as of the end of 2019, two of the most widely used such ratings. We used multiple ESG ratings because of the well-documented, relatively low correlation between different ESG ratings (Florian Berg, Julian F Kölbel, and Roberto Rigobon, 2019; and Christensen et al. 2021). Within our sample, the two ratings are correlated at 0.48. We use a caliper of 0.2 to ensure none of the matched pairs is materially different based on the propensity scores. The use of caliper reduces our matched sample size from 1511 to 957. Sensitivity analysis using different caliper values is performed, and results are similar.

Table 4

Additional Controls

Variables	Model 1	Model 2
Crisis Response	0.0154	0.0154
	3.33	3.30
MSCI ESG rating	0.0030	
	2.35	
Sustainalytics ESG rating		-0.0031
		-1.01
RD&SGA	0.0068	0.0078
	1.94	2.26
Lagged flow	-0.0290	-0.0355
	-0.98	-1.16
Lagged return	-0.0930	-0.0739
	-2.34	-1.76
Lagged holding	-0.0388	-0.0298
	-0.56	-0.42
Market cap	0.0155	0.0170
	6.30	6.56
ROE	0.0370	0.0386
	1.74	1.78
E/P	0.0035	-0.0241
	0.04	-0.27
BTM	-0.0091	-0.0088
	-0.79	-0.79
Momentum	-0.0144	-0.0156
	-1.22	-1.27
Dividend yield	-0.3238	-0.2529
	-2.02	-1.56
Liquidity	-0.5486	-0.5246
	-4.97	-4.63
Leverage	-0.0128	-0.0089
	-0.99	-0.70
Forecast revision	0.0896	0.0718
	4.55	3.54
N	2417	2392
Adjusted R-squared	0.40	0.40
Country Fixed Effects	Yes	Yes
Subindustry Fixed Effects	Yes	Yes

Table 4 presents estimated coefficients and below those t-statistics. Dependent variable is the firm-level stock returns minus the country-level market returns cumulated between February 20, 2020 and March 23, 2020. All variables are defined in the Appendix. is the firm-level stock returns minus the country-level market returns cumulated between February 20, 2020 and March 23, 2020. All variables are defined in the Appendix.

Findings of Matched Sample Analysis

To complement our regression analysis, we also performed a propensity score matching analysis that aims to produce a group of control companies that look as similar as possible to the "high" Crisis Response companies in our sample. A company was defined as High Response (H) if it had a Crisis Response value greater than the median; otherwise, it is defined as Low Response (L). By generating and comparing matched pairs of firms, we aimed to reduce any bias attributable to confounding variables contributing to the crisis returns of the High Response group, increasing our confidence that the difference between the matched firms' stock returns in indeed the effect of different corporate crisis responses.

We matched each High Response firm with a control firm with the same subindustry classification. Within the same subindustry, we used nearest neighbor matching based on propensity scores generated using a logit regression on the variables capable of affecting crisis stock returns such as firm size, ROE, dividend yield, valuation ratios, liquidity, leverage, analyst earnings forecasts, and institutional money holdings and flows. The propensity score matching is produced with replacement and a standard caliper.[40] In the untabulated results for the logit regression, we found economy, E/P, and forecast revision load with a positive and significant coefficient, while size, ROE and liquidity loadings were significant but negative.

Using these matched samples, we compared the crisis returns for the High Response group and the matched group. As can be seen in (the first line of) Table 5, during the market crash from February 20 to March 23, 2020, there was an economically meaningful and statistically significant difference in stock returns of almost 2.5% between the High Response group and the matched group.[41]

Identifying Other Contributors

We estimated models in which our response measure was made to interact with a number of company, industry, and country level characteristics.[42] Our aim in this was twofold. First, to understand the contingent nature of the relationship between crisis corporate responses and stock returns, and the contexts in which those responses might be more likely to be interpreted as signals of corporate resilience. Second, to increase confidence in the hypothesized mechanism driving the relationship (rather than, say, an alternative explanation, which would need to explain not only the average relationship, but also how and why the relationship varies with these characteristics.

Company-Specific Effects

At the individual firm level, we used as one independent variable a measure of the "salience" of a company's response. We expected the positive association between Crisis Response

40 We use a caliper of 0.2 to ensure none of the matched pairs is materially different based on the propensity scores. The use of a caliper reduces our matched sample size from 1511 to 957. Sensitivity analysis using different caliper values is performed, and results are similar.

41 The standardized bias between the two groups had a value of 0.17, also suggesting major differences between the two groups.

42 We mean adjust the Salience, and the country-level variables so the base term of Crisis Response can be evaluated when the interaction term is set at the mean value of those variables, which is zero. The indicator variables for Routine Tasks, B2C and Stalled are kept as indicator variables as the Crisis Response base term if evaluated at zero for them.

Table 5

Propensity Score Matching Results

Variables	Unmatched Low Response firms (L) mean	High Response firms (H) mean	Matched Low Response firms (M) mean	Mean difference between H and M	P-value of paired t-test between H and M	Standardized bias between H and M
Crisis return	-5.11%	-1.74%	-4.21%	2.47%	0.0000	0.1746
Economy	-0.5364	-0.2365	-0.2298	-0.0066	0.8376	0.0074
Lagged flow	-0.0022	-0.0001	-0.0026	0.0024	0.3705	0.0409
Lagged return	-0.0136	-0.0092	-0.0091	-0.0001	0.9848	0.0008
Lagged holding	-0.0075	-0.0046	-0.0050	0.0004	0.8191	0.0099
Market cap	23.0662	22.5698	22.5984	-0.0287	0.4120	0.0289
ROE	0.1486	0.1295	0.1225	0.0070	0.3107	0.0445
E/P	0.0574	0.0566	0.0519	0.0047	0.0209	0.0910
BTM	0.6221	0.6206	0.5883	0.0323	0.1197	0.0591
Momentum	0.1320	0.1392	0.1421	-0.0029	0.8020	0.0108
Dividend yield	0.0262	0.0242	0.0243	-0.0001	0.8908	0.0054
Liquidity	0.7562	0.7455	0.7451	0.0004	0.7919	0.0101
Leverage	0.2285	0.2226	0.2294	-0.0068	0.4615	0.0314
Forecast revision	-0.0653	-0.0472	-0.0443	-0.0028	0.6832	0.0170
N	1512	957	957	957	957	957

Table 5 presents Propensity Score matching result. A firm is defined as High Response (H) if the firm has greater than median Crisis Response value; otherwise, it is defined as Low Response (L). All variables are defined in the Appendix.

and returns to be stronger in cases where the response was deemed more salient for the company in either strengthening (or damaging) relationships with stakeholders. We measured Salience as (the natural logarithm of) one plus the ratio of the number of COVID-19-specific documents that have been tagged divided by the company's market capitalization on February 19 (the day before we start measuring our dependent variables). Our reason for scaling the number of documents by market cap or size was the tendency of larger companies to have more documents and receive more attention.

As reported in Table 6, our findings for Model 1 confirmed our prediction about salience. The interaction term between the Salience and Crisis Response variables was positive and significant in Model 1. As the variable of salience increased by two standard deviations, a two standard deviation increase in Crisis Response was accompanied by 3.8% higher stock returns, as compared to the 2.2% returns for the model without the interaction term (reported earlier in Table 3).

Moreover, we also tested whether these responses are a "luxury good" in the sense that if such responses could be afforded only by the most profitable companies, we would expect corporate profitability to be positively associated with our Crisis Response variable. But when measuring firm profitability as return on equity,[43] we failed to find evidence that profitability moderates Crisis Response. Whereas the luxury good argument would suggest a positive coefficent on the interaction term between the profitability and response variables (in our Model 2), the coefficient was in fact negative and statistically insignificant.

Industry-Level Effects

At the industry level, we focused on two key characteristics of industries for which we expected those responses to be more likely to represent credible commitments to stakeholders. In both cases, because the commitment to stakeholders was expected to be more costly, it was also more likely to be both credible and hard to imitate (or "fake" with "greenwashing").

First, we analyzed whether Crisis Response might be more strongly associated with returns as a function of an industry's type of jobs and, in particular, the extent to which the jobs require manual physical routine labor. We expected a more positive Crisis Response to be more important in those industries, where efforts to protect labor were a more pressing social concern and more intensely scrutinized. Using a variable we called "Routine Tasks" that was measured at the "subindustry" level,[44] we found a strong positive interaction

43 Using return-on-assets yields similar results.

44 This variable is sourced from the literature in technology and jobs as tasks requiring more manual, physical, and routine labor are more likely to be automated in the future. It is constructed as the probability that job tasks might be automated in a subindustry given the tasks performed by workers within the subindustry across the different jobs

(in our Model 3) between our response variable and stock returns in those industries where Routine Tasks takes a high value—automobile manufacturers, textiles, steel, insurance brokers, electrical components, and equipment. At the same time, we found no detectable association between Response and stock returns in industries where Routine Tasks have a low value, including systems software, advertising, electric utilities, cable, and satellite.

Second, we looked for a stronger association between Crisis Response and stock returns in industries that were disproportionately affected by major changes in the global economy, such as travel bans, social distancing, and lockdowns. To identify industries that were more severely impacted by this crisis, we introduce an indicator variable ("Stalled"), which takes the value of one for industries with a drastic increase in unemployment over the crisis and subindustries directly and negatively impacted by travel bans.[45] Examples of Stalled subindustries are airlines, airport services, leisure facilities, hotels, resorts, and cruise lines. Examples of subindustries not "Stalled" according to this indicator are food retailers and pharmaceuticals. As reported using our Model 4, we found the interaction between Response and stock returns to be significantly positive in "Stalled" industries.

Finally, we examined the association of Crisis Response and stock returns across companies with two different kinds of business models: (1) direct to consumer sales models, in which building brands that people feel emotionally tied to but which also entail making relatively quick decisions; and (2) business-to-business models, where the decision-making process around sales is more elaborate and longer-term, involving many more stakeholders with stickier, longer-term contracts. For example, whereas online retailers and restaurants sell directly to consumers and those purchases in some instances are received within moments, semiconductor companies selling to tech hardware companies are intent on building and maintaining even longer-term relationships with specific customers.

To the extent the market reaction to corporate responses reflects differences in how COVID-19 affects the economics of different businesses, one might expect more notable effects in business-to-consumer settings. To capture this characteristic, we used an indicator variable (B2C) assessed at the subindustry level that takes relatively higher values for industries like soft drinks, household products, and broadcasting. Examples of subindustries that are not B2C are chemicals and advertising. As reported under Model 5 in Table 6, the interaction term was not significant, suggesting that, when assessing the effectiveness of corporate responses to stock returns during COVID, the market did not discriminate between companies in B2C and B2B industries. Model 6 includes all the interaction terms together and reaches similar conclusions.

Country-level Effects

At the country level, we looked at two characteristics. We expected the relationship between crisis response and stock returns to be strongest for companies headquartered in countries where stakeholder relations are deemed to be most important. The country-level data are coming from the IMD World Competitiveness report[46] that assesses each country's competitiveness. The assessment includes surveys of managers in each country.

We measured the importance of stakeholder relations in a given country using a variable that measures if companies in the country focus on customer satisfaction (Customer) and a variable that measures if companies in the country focus on attracting and retaining talent (Talent). This reflects two of the stakeholders included in our corporate response measures; in the case of the third group, suppliers, there is no measure available in the dataset.[47]

As reported in Model 7, we found the interaction term with customers to be positive and significant. In countries deemed to have greater corporate focus on customer satisfaction (two standard deviation increase in these measures), a two standard deviation increase in the Crisis Response measure was associated with 3.52% and 3.92% higher stock returns, respectively. In Model 8, we found the interaction term between talent and crisis response to be positive but insignificant.[48] (We did not add the two country variables in the same model because of their high positive correlation between the variables.)

(Carl B. Frey and Michael A. Osborne, 2017, The Future of Employment: How Susceptible Are Jobs to Computerisation? *Technological Forecasting and Social Change*, 114, pp. 254-280; and Kotsantonis and Serafeim 2020). We code this variable as an indicator variable taking the value of 1 for two-thirds of the subindustries in our sample (where probability>0.6) as the distribution of the probability is highly left skewed where a large number of industries have a high probability of automation and only a small number of subindustries having a low probability.

To assess large increases in unemployment, we referred to the Bureau of Labor Statistics' change in unemployment rates from February to April 2020.

45 To assess large increases in unemployment, we referred to the Bureau of Labor Statistics' change in unemployment rates from February to April 2020.

46 IMD *World Competitiveness Yearbook*, 2019.

47 Because survey participants are likely to respond more favorably across all measures for countries where it is easier to do business in and where the environment is more business friendly, we estimate country-level models to remove that "halo" effect. This approach is consistent with prior literature that uses survey data and seeks to control for that halo effect (Luigi Guiso, Paola Sapienza, and Luigi Zingales Guiso, 2015, "The Value of Corporate Culture," *Journal of Financial Economics*, 117(1), pp. 60-76). Therefore, the measures we use are the residuals after regressing on a measure in the same World Competitiveness Report around the "ease of doing business" in the country.

48 We do not include country fixed effects in Table 6 so the coefficients on the country-level variables can be estimated.

Table 6

Regression Results for Moderating Effects

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Crisis Response	0.0077	0.0145	-0.0043	0.0075	0.0126	-0.0028	-0.0028	-0.0026
	1.71	2.46	-0.58	1.69	2.26	-0.33	-0.33	-0.31
Crisis Response x Salience	0.0099					0.0085	0.0117	0.0104
	2.34					2.00	2.67	2.40
Salience	0.0014					0.0009	0.0023	0.0003
	0.30					0.20	0.51	0.06
Crisis Response x ROE		-0.0234				-0.0242	-0.0188	-0.0243
		-0.9439				-1.01	-0.78	-1.01
Crisis Response x Routine Tasks			0.0400			0.0235	0.0212	0.0213
			2.67			2.79	2.47	2.50
Routine Tasks			0.0144			-0.0077	-0.0118	-0.0119
			0.56			-0.62	-0.96	-0.98
Crisis Response x Stalled				0.0400		0.0313	0.0301	0.0298
				2.67		2.03	1.86	1.84
Stalled				0.0144		0.0037	-0.0061	-0.0087
				0.56		0.14	-0.23	-0.33
Crisis Response x B2C					-0.0040	-0.0121	-0.0122	-0.0108
					-0.53	-1.62	-1.58	-1.41
B2C					0.0352	0.0338	0.0355	0.0366
					2.83	2.62	2.69	2.76
Crisis Response x Customer							0.0146	
							2.34	
Customer							0.0174	
							3.22	
Crisis Response x Talent								0.0100
								1.33
Talent								0.0090
								1.47
Economy	0.0082	0.0084	0.0087	0.0085	0.0085	0.0083	0.0076	0.0077
	3.69	3.79	3.91	3.83	3.87	3.76	3.52	3.52
Lagged flow	-0.0202	-0.0217	-0.0203	-0.0210	-0.0209	-0.0150	-0.0173	-0.0174
	-0.69	-0.74	-0.69	-0.72	-0.71	-0.51	-0.59	-0.59
Lagged return	-0.0272	-0.0258	-0.0233	-0.0263	-0.0243	-0.0295	-0.0127	-0.0152
	-0.72	-0.68	-0.62	-0.69	-0.64	-0.78	-0.35	-0.42
Lagged holding	0.0030	0.0013	0.0036	0.0013	0.0041	0.0155	0.0176	0.0211
	0.04	0.02	0.05	0.02	0.06	0.23	0.26	0.30
Market cap	0.0155	0.0164	0.0165	0.0161	0.0162	0.0151	0.0164	0.0162
	6.96	7.34	7.37	7.19	7.23	6.85	7.52	7.47
ROE	0.0341	0.0233	0.0340	0.0354	0.0367	0.0182	0.0080	0.0033
	1.65	0.94	1.63	1.70	1.76	0.74	0.33	0.14
E/P	-0.1149	-0.1229	-0.1155	-0.1210	-0.1326	-0.1072	-0.0938	-0.0884
	-1.46	-1.55	-1.45	-1.52	-1.67	-1.37	-1.22	-1.14
BTM	-0.0189	-0.0207	-0.0211	-0.0207	-0.0202	-0.0189	-0.0103	-0.0082
	-2.20	-2.41	-2.47	-2.41	-2.36	-2.22	-1.30	-1.05
Momentum	-0.0281	-0.0280	-0.0284	-0.0276	-0.0269	-0.0281	-0.0235	-0.0246
	-2.42	-2.43	-2.48	-2.40	-2.34	-2.45	-2.08	-2.17
Dividend yield	-0.2467	-0.2585	-0.2760	-0.2592	-0.2415	-0.2507	-0.2278	-0.2470
	-1.72	-1.79	-1.92	-1.80	-1.67	-1.76	-1.67	-1.82
Liquidity	-0.5664	-0.5854	-0.5836	-0.5935	-0.5817	-0.5576	-0.6442	-0.6087
	-5.73	-5.94	-5.92	-6.03	-5.93	-5.68	-8.84	-8.60

>

Table 6
(continued)

Leverage	-0.0183	-0.0174	-0.0173	-0.0186	-0.0168	-0.0188	-0.0197	-0.0202
	-1.57	-1.49	-1.49	-1.60	-1.45	-1.63	-1.71	-1.75
Forecast revision	0.0825	0.0842	0.0823	0.0839	0.0843	0.0815	0.0810	0.0818
	4.16	4.23	4.13	4.17	4.22	4.15	4.17	4.21
N	3023	3023	3023	3023	3023	3023	3022	3022
Adjusted R-squared	0.34	0.33	0.34	0.34	0.34	0.34	0.31	0.31
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 6 presents estimated coefficients and below those t-statistics. Dependent variable is the firm level stock returns minus the country level market returns cumulated between February 20, 2020 and March 23, 2020. All variables are defined in the Appendix.

Conclusion

During a market crisis, investors are looking for evidence of corporate resilience. In this paper we summarize the findings of our recent study that aims to answer the question: did companies that invest heavily in stakeholder relationships demonstrate stronger stock market performance during the COVID-19 market collapse as a consequence of those investments?

Collectively, our findings provide the first evidence on market response during the COVID-19-induced market collapse, as a function of corporate Crisis Responses. We have attempted to limit the possible confounding effect of other possible explanations through our research design choices and by presenting alternative specifications: controlling for firm characteristics that are likely to be determinants of crisis stock returns, including a sentiment measure that directly proxies for the business effect of COVID-19 on each company.

Our findings suggest that investments in stakeholder relations could be viewed, and indeed valued, as strategic resources, especially in a business context in which such investments represent a credible and costly commitment to those stakeholders. Future research could examine the effects of those corporate responses on employee morale or customer behavior. Moreover, our results suggest that the application of machine learning to big data of unstructured text represents a promising technology for measuring corporate responses and associated crisis management efforts. Understanding the interplay between corporate disclosure, media, and social media activity, and corporate responses has the potential to provide a fuller understanding of how these technologies can be used to find new ways of evaluating organizational behavior.

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Appendix

Table 5 shows the statistics for matching quality and results. For most of the confounding variables used in the propensity score matching process, the matched low response group (M) looked much more similar to the High Response group (H) than the unmatched group (L), as reflected in the mean estimates. To assess the matching quality, we present both the statistical paired t-test and the standardized bias. Statistical significance testing, although straightforward, has the shortcoming that it is sensitive to sample size,[49] and often is discouraged from use.[50] According to the t-tests, none of the differences in the mean estimates across the H and M groups were statistically significant, except E/P. A preferred approach is to evaluate the matching quality using the standardized bias for each covariate which is defined in Paul Rosenbaum and Donald Rubin's 1983 article in *Biometrika*.[51] All covariates, including E/P, have standardized bias between H and M less than 0.1, indicating successful matching. In other words, the High Response group and the matched group are very similar in terms of their size, evaluation ratios, dividend yield, profitability, liquidity, leverage, forecast revisions, economic impact from COVID-19, pre-market crash performance as well as institutional investor ownership and flows.

Human Capital (HC) = sentiment measure capturing a company's action (inaction) regarding layoffs, working from home, unemployment, and related topics between February12th and March 24th, 2020.

Supply Chain (SC) = sentiment measure capturing a company's action (inaction) regarding operational stoppages, production issues, supply of goods, etc. between February 12th and March 24th, 2020.

Products and Services (PS) = sentiment measure capturing a company's action (inaction) regarding any shift in a company's operations to produce in-demand products, materials and other crisis-specific products or services between February12thand March 24th, 2020.

Crisis Response = sentiment measure capturing a company's action (inaction) on HC, SC, and PS by averaging the three measures.

Economy = sentiment measure capturing market and product trends that effected a company between February 12th and March 24th, 2020.

Salience = natural logarithm of one plus the number of COVID-19-specific documents tagged to a company relative to the company's market capitalization between February12th and March 24th, 2020.

Routine Tasks = subindustry level assessment describing the type of tasks need to be performed by a company's typical employee where a higher value represents a subindustry jobs requiring primarily physical, manual and routine labor. Takes the value of one if the probability is greater than 0.6 which represents the top two terciles.

B2C = subindustry level assessment identifying subindustries where most of the products and services are sold to consumers rather than other businesses.

Stalled = assessment of subindustries most impacted by the crisis including the highest increases of unemployment and largest drop in year on year revenues.

Customer = the residual of a country's score in the 2019 assessment of the IMD World Competitiveness Report assessing whether "Customer satisfaction is emphasized in companies" after orthogonalizing with respect to a measure of "Ease of doing business."

Talent = the residual of a country's score in the 2019 assessment of the IMD World Competitiveness Report assessing whether "Attracting and retaining talents is a priority in companies" after orthogonalizing with respect to a measure of "Ease of doing business."

Dividend Yield = dividend per share over stock price as of February 19th, 2020.

Earnings-to-Price Ratio = earnings per share over stock price as of February 19th, 2020.

Book-to-Market = book over market value of equity as of February 19th, 2020.

Market Capitalization = natural logarithm of market capitalization as of February 19th, 2020.

Return on Equity = net income over shareholder's equity as of February 19th, 2020.

Leverage = total debt/total asset for a firm as of February 19th, 2020.

Momentum = 12-month minus 1-month stock returns (in USD) as of February 19th, 2020.

Liquidity = average of logarithm of daily trading volume to logarithm market cap value from the 20 trading days preceding the market crash on February 19th, 2020.

Forecast Revision = Analyst forecast revisions for EPS from IBES, calculated as forecasted EPS on March 31, 2020 minus forecasted EPS on January 31, 2020, scaled by absolute value

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49 See Peter C. Austin, "An introduction to propensity score methods for reducing the effects of confounding in observational studies," *Multivariate Behavioral Research*, 46(3), pp. 399–424, 2011; and Kosuke Imai, Gary King, and Elizabeth Stuart, "Misunderstandings Among Experimentalists and Observationalists about Causal Inference," *Journal of the Royal Statistical Society*, Series A, 171, part 2, Pp. 481–502, 2008. Copy at https://j.mp/2oTwIUA

50 See Wei Pan and Haiyan Bai (editors), *Propensity Score Analysis: Fundamentals and Developments*, 2015, Guilford Press.

51 See Paul Rosenbaum and Donald Rubin, "The Central Role of the Propensity Score in Observational Studies for Causal Effects," *Biometrika*, 70, pp.41–50, 1983.

of the forecast on January 31, 2020.

Crisis Returns = cumulated firm stock returns (in USD) minus cumulated country stock returns between February 20th and March 23rd, 2020.

Lagged Returns = cumulative 20-day lagged stock returns (USD) minus cumulated country stock returns as of February 19th, 2020.

Lagged Flows = cumulative 20-day lagged active institutional investor money flows relative to total equity assets under management as of February 19th, 2020. We multiply this by 10000 for scale.

Lagged Holdings = excess institutional investor money holdings over market capitalization as of February 19th, 2020. We multiply this by 10^13 for scale.

RD&SGA = Stock-transformed R&D + 1/3*SG&A using a 5-year amortization period.

Appendix

Table 1: Sample Universe Country Breakdown

Countries	Number of firms	Market Cap (in billion USD)
AE	1	13.1
AR	3	10.5
AT	14	80.8
AU	127	1,122.6
BE	17	270.3
BR	38	539.0
CA	150	1,861.4
CH	59	1,539.5
CL	11	75.8
CN	104	2,449.8
CO	4	55.1
CZ	3	20.1
DE	93	1,652.3
DK	27	392.4
EG	1	8.0
ES	38	654.2
FI	18	179.8
FR	92	2,412.3
GB	222	2,567.4
GR	6	21.5
HK	48	1,055.6
HU	3	25.0
ID	15	244.5
IE	7	48.5
IL	10	91.6
IN	78	1,334.7
IT	48	600.8
JP	339	4,354.3
KR	79	959.0
MX	22	250.6
MY	33	242.6
NL	32	606.4
NO	18	181.0
NZ	14	62.4
PE	3	48.6
PH	17	147.2
PL	10	61.1
PT	4	45.9
RU	12	465.1
SA	3	108.3
SE	48	423.5
SG	36	319.3
TH	28	255.7
TR	8	46.4
TW	58	767.8
US	986	28,214.6
ZA	36	324.2
Total	3023	57,210.5

Appendix Table 1 presents the universe of countries, number of firms per country and market capitalization per country in the study sample period.

Appendix
Table 2: Sample Universe Industry Breakdown

GICS Industry Code	GICS Industry Names	No. of firms	Market Cap (in billion USD)
101010	Energy Equipment & Services	19	141.5
101020	Oil, Gas & Consumable Fuels	126	2,687.2
151010	Chemicals	103	1,298.1
151020	Construction Materials	25	194.7
151030	Containers & Packaging	19	147.6
151040	Metals & Mining	110	998.5
151050	Paper & Forest Products	14	84.7
201010	Aerospace & Defense	32	725.3
201020	Building Products	20	197.1
201030	Construction & Engineering	41	298.5
201040	Electrical Equipment	34	464.4
201050	Industrial Conglomerates	34	821.7
201060	Machinery	108	931.1
201070	Trading Companies & Distributors	28	295.7
202010	Commercial Services & Supplies	41	337.7
202020	Professional Services	33	434.4
203010	Air Freight & Logistics	16	236.9
203020	Airlines	22	211.2
203030	Marine	9	55.1
203040	Road & Rail	42	732.1
203050	Transportation Infrastructure	30	257.4
251010	Auto Components	42	316.6
251020	Automobiles	35	981.7
252010	Household Durables	41	369.5
252020	Leisure Products	11	73.3
252030	Textiles, Apparel & luxury goods	41	936.2
253010	Hotels, Restaurants & Leisure	81	758.6
253020	Diversified Consumer Services	10	72.2
255010	Distributors	4	27.0
255020	Internet & Direct Marketing Retail	27	2,037.3
255030	Multiline Retail	27	289.6
255040	Specialty Retail	53	675.2
301010	Food & Staples Retailing	50	1,109.7
302010	Beverages	37	1,206.2
302020	Food Products	96	1,252.4
302030	Tobacco	6	292.1
303010	Household Products	10	529.8
303020	Personal Products	22	421.8
351010	Health Care Equipment & Supplies	56	1,264.8
351020	Health Care Providers & Services	47	966.4
351030	Health Care Technology	8	104.6
352010	Biotechnology	57	803.3
352020	Pharmaceuticals	71	2,886.4
352030	Life Sciences Tools & Services	20	423.6
401010	Banks	200	4,791.4
401020	Thrifts & Mortgage Finance	13	93.3
402010	Diversified Financial Services	24	175.3
402020	Consumer Finance	14	258.2
402030	Capital Markets	93	1,600.9
403010	Insurance	93	1,736.4
451020	IT Services	76	2,208.1
451030	Software	90	2,947.6
452010	Communications Equipment	11	285.7
452020	Technology Hardware, Storage & Peripherals	31	2,000.3
452030	Electronic Equipment, Instruments & Components	65	632.3
453010	Semiconductors & Semiconductor Equipment	58	1,967.5
501010	Diversified Telecommunication Services	45	1,320.9
501020	Wireless Telecommunication Services	26	869.4
502010	Media	42	539.5
502020	Entertainment	32	778.3
502030	Interactive Media & Services	25	1,715.8
551010	Electric Utilities	62	1,324.7
551020	Gas Utilities	29	258.5
551030	Multi-Utilities	27	530.9
551040	Water Utilities	9	67.5
551050	Independent Power and Renewable Electricity Producers	19	115.5
601010	Equity Real Estate Investment Trusts (REITs)	99	832.2
601020	Real Estate Management & Development	82	811.1
Total		3023	57,210.5

Appendix Table 2 shows the GICS industry code, industry name and the number of firms per industry and market capitalization per industry in the study sample period.

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