University of Reading

COVID-19 pandemic and global corporate CDS spreads

Article

Accepted Version

Creative Commons: Attribution-Noncommercial-No Derivative Works 4.0

Hasan, I., Marra, M. ORCID: https://orcid.org/0000-0003-0810-7323, To, T. Y., Wu, E. and Zhang, G. (2023) COVID-19 pandemic and global corporate CDS spreads. Journal of Banking & Finance, 147. 106618. ISSN 0378-4266 doi: 10.1016/j.jbankfin.2022.106618 Available at https://centaur.reading.ac.uk/106290/

It is advisable to refer to the publisher's version if you intend to cite from the work. See Guidance on citing.

To link to this article DOI: http://dx.doi.org/10.1016/j.jbankfin.2022.106618

Publisher: Elsevier

All outputs in CentAUR are protected by Intellectual Property Rights law, including copyright law. Copyright and IPR is retained by the creators or other copyright holders. Terms and conditions for use of this material are defined in the End User Agreement.

www.reading.ac.uk/centaur

CentAUR

University of Reading

Central Archive at the University of Reading

Reading's research outputs online

COVID-19 Pandemic and Global Corporate CDS Spreads

Iftekhar Hasan
Fordham University and Bank of Finland
ihasan@fordham.edu

Miriam Marra
University of Reading
m.marra@icmacentre.ac.uk

Thomas Y. To
University of Sydney
thomas.to@sydney.edu.au

Eliza Wu
University of Sydney
eliza.wu@sydney.edu.au

Gaiyan Zhang
University of Missouri-St. Louis
zhangga@umsl.edu

COVID-19 Pandemic and Global Corporate CDS Spreads

Abstract

We examine the impact of the COVID-19 pandemic on the credit risk of companies around the world. We find that increased infection rates affect firms more adversely as reflected by the wider increase in their credit default swap (CDS) spreads if they are larger, more leveraged, closer to default, have worse governance and more limited stakeholder engagement, and operate in more highly exposed industries. We observe that country-level determinants such as GDP, political stability, foreign direct investment, and commitment to crisis management (income support, health and lockdown policies) also affect the sensitivity of CDS spreads to COVID-19 infection rates. A negative amplification effect exists for firms with high default probability in countries with fiscal constraints. A direct comparison between global CDS and stock markets reveals that the CDS market prices in a distinct set of corporate traits and government policies in pandemic times.

JEL Classification: G15; G18; G38; M14

Keywords: Global corporate CDS; COVID-19; corporate resilience; government policies; relative market efficiency

1. Introduction

The COVID-19 pandemic offers a unique opportunity to assess the impact of a worldwide, unanticipated, and exogenous health crisis on corporate credit risk, and to shed light on the firm and country traits and policies that make firms more resilient to this shock.[1] This paper studies from a global perspective how the COVID-19 shock, measured by the country-level weekly change in COVID-19 infection rates during 2020, affects credit default swap (CDS) spreads referencing 655 firms across 27 countries. Specifically, we examine how variation in the sensitivity of CDS spreads to infection rates depends on firm-, industry-, and country-specific characteristics and policies.

We observe a significant increase in average corporate CDS spreads induced by growing COVID-19 infection rates, indicating that global corporate CDS markets priced in higher uncertainty, disruptions to businesses, and escalated credit risk caused by the pandemic. Next, we examine what firm traits and policies can magnify or mitigate the impact of the pandemic. Our specifications control for country-time, industry-time, and firm fixed effects, which allows us to isolate the differential impact of the spread of COVID-19 on CDS spreads as a function of firms' basic financial conditions and policies.

The regression analysis provides consistent evidence that the increase in corporate CDS spreads is more pronounced for larger firms with higher leverage, those that are closer to the default threshold, and those operating in industries more affected by social-distancing constraints. Regarding corporate policies, we find that the change in CDS spreads is smaller for firms engaging in more corporate social responsibility (CSR) activities, suggesting that CSR improves the relationship between a firm and its stakeholders, thereby lowering its credit

[1] On March 11, 2020, the WHO declared the outbreak of the COVID-19 virus a pandemic. According to the Johns Hopkins Center for Systems Science and Engineering, as of June 26, 2020, there were over 10 million confirmed cases of COVID-19 and 502,589 deaths worldwide. As of June 15, 2022, the cumulative number of infections rose to 537 million and the cumulative deaths to 6.3 million globally.

risk during the pandemic, in line with Lins, Servaes, and Tamayo (2017) and Albuquerque, Koskinen, and Zhang (2019). Firms with weaker corporate governance and more entrenched executives have experienced a sharper increase in CDS spreads during the pandemic, supporting the view that managerial entrenchment impedes firms' capacity to take effective action and reduces their resilience (e.g., Shleifer and Vishny, 1997; Cremers and Nair, 2005).

These findings are not only statistically significant but are also economically meaningful. We compare pandemic-induced CDS spread changes between firms with the value of corporate characteristics in the top quartile (Q3) and those in the bottom quartile (Q1). In a country where COVID-19 infection rates double within a week (100% increase), we find that, *ceteris paribus*, firms that are larger, more indebted, and closer to the default threshold experience, respectively, 1.79%, 1.24%, and 1.32% larger weekly increases in CDS spreads than firms in the comparison quartile. Firms with better stakeholder engagement are associated with a 1.5% smaller increase in CDS spreads, while firms entrenched with antitakeover provisions are associated with a 1.2% higher weekly increase in CDS spreads. These differences are large given that the mean weekly change in CDS spreads is 0.26%.

One advantage of the cross-country setting is that it also allows us to investigate the impact of *country-level* traits and policies on corporate credit risk changes during the COVID-19 crisis. After controlling for key firm-level characteristics, we find that firms in countries with higher GDP and GDP growth, lower foreign direct investment, and higher political stability are more resilient to the pandemic.

Country-level variables also carry strong economic significance. Firms domiciled in countries with higher GDP, greater GDP growth, political stability, and lower foreign direct investment are respectively associated with 2.38%, 1.23%, 3.79%, and 0.36% lower weekly increases in CDS spreads than are firms in the comparison groups, assuming a doubling in

COVID-19 weekly infection rates. The analysis of economic magnitude illustrates the order of importance of firm and country characteristics.

In terms of the impact of domestic government policies, the joint implementation of lockdown and health policies, and the provision of income-support packages (in decreasing order of economic significance) help firms to contain their credit risk. These policies more effectively limit the transmission of the virus and provide support to families and businesses.

Furthermore, the cross-country setting enables us to examine whether amplification effects exist between country- and firm-level factors. Augustin, Sokolovski, Subrahmanyam, and Tomio (2022) show that countries with better fiscal capacity are more resilient to the COVID-19 crisis. Our analysis reveals that limited government fiscal capacity can amplify credit risk deterioration for riskier firms closer to the default threshold.

Lastly, we run a comparative analysis of the sensitivity of stock returns and CDS spread changes (at the daily frequency) to the growing rate of COVID-19 infections. We find two-way information flows between stock and CDS markets during the pandemic. Moreover, the reactions of the two markets are hinged on distinct firm traits and policies. The reaction of firm stock returns is primarily linked to their profitability and volatility. In contrast, size, leverage, and stakeholder engagement are most relevant for CDS spreads.

Our paper contributes to the growing list of studies on COVID-19 in two major ways. First, to the best of our knowledge, this study is the first to focus on the impact of COVID-19 on international corporate *credit risk*. Our study complements the literature on global stock market reactions to COVID-19. Different from stock prices reflecting a search for investment opportunities and incorporating both cash flow news and uncertainty (e.g., Vuolteenaho, 2002), CDS prices primarily reflect credit risk, which is the specific focus of our paper. We find that firm-level fundamentals and corporate policies that affect CDS spread changes during a pandemic differs markedly from those affecting stock returns.

Second, departing from CDS studies focusing on a single country (e.g., Liu et al, 2021), our study examines cross-country and time-varying reactions of *global* corporate CDS markets to COVID-19. Because COVID-19 has affected every country with varying intensity and speed, it offers us a unique opportunity to evaluate CDS reactions to the severity of the outbreak in each country and to assess the relevance of country features and policies. Unlike earlier studies using data from the first quarter or the first half year in 2020, our study spans the first and second waves of virus circulation over the entire year to explore CDS reactions at different stages of the pandemic. Our study demonstrates that a country's political instability and fiscal constraints not only worsen its sovereign risk, but also intensify the negative impact of COVID-19 on the credit risk of riskier firms.

The remainder of the paper is organized as follows. Section 2 reviews the literature on the impact of COVID-19 on financial markets; Section 3 discusses the methodology and data used; Section 4 discusses the results of the empirical analysis; and Section 5 concludes the paper.

2. Literature Review on COVID-19 Impact on Financial Markets

The literature on the impact of COVID-19 on financial markets is fast growing. Several studies examine the U.S. *stock* market reactions in response to COVID-19 at both the market and firm levels. At the market level, studies have shown that government restrictions on commercial activity, voluntary social distancing, and unanticipated COVID-19 infection forecasts are the main reasons behind the unprecedented U.S. stock-market plunge (e.g., Baker, Bloom, Davis, Kost, Sammon, and Viratyosin, 2020). At the firm level, firms with higher leverage, fewer cash reserves, lower profitability, higher capital intensity, high environmental and social ratings, and those in industries more conducive to disease transmission and less resilient to the need for social distancing underperform in the stock market (e.g., Acharya and

Steffen, 2020; Albuquerque, Koskinen, Yang and Zhang, 2020; Baker et al., 2020; Ramelli and Wagner, 2020; Fahlenbrach et al., 2021). Ding, Levine, Lin, and Xie (2021) conduct a global study of stock returns in the first quarter of 2020 and corroborate that corporate characteristics influence the effect of the pandemic on stock price declines.

To date, however, limited research has been performed on the impact of the spread of COVID-19 on global *credit* markets. Haddad et al. (2021) document extreme disruptions in U.S. corporate bond markets with a severe price crash, including large holdings of investment-grade bonds trading at a discount to CDS due to an acute need for liquidity on the part of specific bond investors such as mutual funds.[2] Falato et al. (2021) and O'Hara and Zhou (2021) also study illiquidity and frictions in the U.S. bond market during the COVID-19 crisis. Given documented disruptions to the liquidity and functioning of the corporate bond market during the COVID-19 crisis, we use CDS spreads as a measure of corporate credit risk in our study. Liu et al. (2021) document a substantial increase in CDS spreads for U.S. firms that needed to roll over their existing debts during the first wave of COVID-19. Our study differs from theirs in that we investigate a broad sample of international corporate CDSs and examine a large range of firm-specific and country-wide characteristics and policies that may affect the sensitivity of corporate credit risk to the COVID-19 crisis.

Our study is also closely related to Augustin et al. (2022), who find a positive and significant sensitivity of sovereign CDS spreads to the intensity of the virus's spread for fiscally constrained governments, showing that countries with better fiscal capacity are more resilient to the COVID-19 crisis. These results indicate that credit market investors are concerned about

[2] Our results show some evidence that the CDS spreads of investment-grade firms (and firms that are farther away from the default threshold) are *less* affected by COVID-19, which seems to contradict Haddad et al. (2021), who find that the biggest negative impact of COVID-19 was on investment-grade bonds. However, their finding is not driven by a more severe increase in credit risk of investment-grade bonds (than for speculative bonds), but rather is a result of liquidity-driven trading of bond portfolio investors who unwind positions in investment-grade bonds to hoard liquidity reserves. The massive sale of these bonds causes bond-price declines and bond spreads to rise (above the CDS spreads). Haddad et al. (2021) observe that, across investment-grade firms, movements in bond spreads are poorly related to movements in CDS spreads, while they are much more aligned across speculative firms; the latter are driven by higher credit risk rather than by trading frictions.

countries that are fiscally constrained. Our firm-level focus in an international setting allows us to further examine the interaction effects of country and firm characteristics and policies in amplifying or alleviating the adverse effects of the spread of COVID-19 on corporate credit risk.

3. Methodology and Data

3.1 Panel Regression

To evaluate how firm- and country-level characteristics and a diverse range of policies shape CDS spread reactions to COVID-19, we use the following regression model, which is similar to Ding et al. (2021):

$$\Delta CDS_{i,j,c,t} = \boldsymbol{\beta} \boldsymbol{X}'_{\boldsymbol{pre2020}} * COVID19_{c,t} + \delta_i + \delta_{j,t} + \delta_{c,t} + \varepsilon_{i,j,c,t} \quad (1)$$

where subscript i, j, c, and t indicate respectively firm, industry, country, and week. The dependent variable, $\Delta CDS_{i,j,c,t}$, is the weekly change in log CDS spreads of firm i (operating in industry j and domiciled in country c) from the last trading day in week t − 1 to the last trading day in week t. $COVID19_{c,t}$ is the weekly percentage change in the COVID-19 infection rate in country c during week t.

Eq. (1) contains several interactions between pre-pandemic firm and country characteristics/policies, $\boldsymbol{X}_{\boldsymbol{pre2020}}$, and $COVID19$. $\boldsymbol{\beta}$ captures the impact of those factors on the elasticity of credit spreads to COVID-19 infections. The inclusion of firm (δ_i), industry-time ($\delta_{i,t}$), and country-time ($\delta_{c,t}$) fixed effects conditions out time-invariant differences across firms and time-varying industry and country factors, including policy reactions to the crisis and differences in macroeconomic, legal, cultural, institutional, and political systems. We estimate Eq. (1) using ordinary least squares, with robust standard errors clustered at the firm level.[3]

[3] Thompson (2011) and Cameron and Miller (2015) suggest that fewer than 50 categories within a cluster is insufficient; clustering with too few categories creates noisy standard errors. Since our sample contains 27

All definitions for the variables included in $\boldsymbol{X_{pre2020}}$ and their data sources are provided in Appendix A. In the following paragraphs, we justify their use and develop testable hypotheses.

3.2 Corporate Characteristics

We consider six basic financial characteristics that are likely to influence corporate resiliency to COVID-19 disruptions: leverage ratio, stock-return volatility, firm size, cash holdings, profitability, and an investment-grade dummy variable. According to structural credit-risk models (Black and Scholes, 1973; Merton, 1974), firm leverage and asset volatility are two key determinants of credit spreads. Stock volatility is used as a proxy to measure asset volatility. Ericsson et al. (2009) provide empirical evidence that structural variables explain the level and changes of CDS spreads. Firms with investment-grade credit ratings obtain easier, less costly, and wider access to refinancing and emergency credit lines. Those with greater profitability are better able to deal with sudden external shocks such as COVID-19. Following Bharath and Shumway (2008), we also calculate the distance to default, which is used as an alternative measure of default risk (to subsume known default predictors like leverage, stock-return volatility, and investment-grade status).

The impact of firm size and cash holdings is ambiguous, however. On the one hand, larger companies with greater access to capital and technology tend to be in much more liquid positions and may be less affected by supply-chain problems and volatility. On the other hand, smaller corporations are more in tune with local conditions and could be more flexible, creative, and responsive to external shocks.

A firm with higher cash holdings may be able to withstand declining business revenues and operations for a longer time and hence its credit risk should be less impacted by the shock.

countries, we favor clustering at the firm level instead of following Ding et al. (2021) to cluster standard errors at the country level (their sample comprises 61 countries as they use stock data).

However, Bates, Kahle and Stulz (2009) and Acharya, Davydenko and Strebulaev (2012) argue that risky firms strategically hold more cash as a precautionary measure to protect themselves against adverse cash-flow shocks. Therefore, it is important to examine how size and cash holdings relate to a firm's resilience to the pandemic as reflected in the global corporate credit market.

3.3 Firms' Policies and Institutional Features

Past literature suggests that CSR policies can help reduce credit risk via two channels: first, better employee performance and higher trust and loyalty from suppliers and customers ahead of or during difficult times (e.g., Lins, Servaes, and Tamayo, 2017; and Albuquerque, Koskinen, and Zhang, 2019); and second, better long-term corporate financial performance, higher firm valuation and cost of capital savings (e.g., El Ghoul et al., 2011).

However, CSR policies may impact corporate credit risk negatively for other reasons. CSR activities involve investments to improve social well-being with or without direct benefit to corporate financial well-being. In the short run, the high 'price' a firm must pay in exchange for these benefits may reduce the firm's profitability (Chen, Hung, and Wang, 2018). It is also possible that some CSR investments are wasteful; for instance, when managers spend stakeholders' money on philanthropic projects, a portion of the CSR engagement could have little or no effect on a firm's competitiveness (Masulis and Reze, 2015).

Taken together, the effect of CSR on CDS spread changes during the COVID-19 pandemic depends on the benefit and cost trade-off of firm-specific investments in CSR-related activities. Following the literature, we use three proxies to measure CSR performance: stakeholder engagement, CSR reporting, and CSR strategy score.

Existing research also suggests that corporate governance policies can shape corporate behavior, valuations, and lower the cost of debt. A higher number of independent board directors monitoring and advising executives can increase the volume and quality of the

information disclosed (Armstrong, Core, and Guay, 2014). A higher proportion of independent directors enhances the decision-making process and leads to less risk-taking. Moreover, independent directors provide the firm with different skills and perspectives to solve financial distress issues and avoid bankruptcy, resulting in lower credit risk (Bhojraj and Sengupta, 2003; Fields, Fraser, and Subrahmanyam, 2012). However, other studies also observe a null effect (Anginer et al., 2018).

The impact of anti-takeover provisions on credit risk can be theoretically ambiguous. On the one hand, anti-takeover provisions can be bad for all firm stakeholders, since they may result in higher managerial entrenchment by insulating the manager from the disciplining power of takeover markets and providing more room to engage in value-decreasing actions (Bebchuk and Cohen, 2005). Furthermore, anti-takeover provisions may also prevent takeovers that may be potentially beneficial for the firm's creditors.

On the other hand, high takeover defenses may benefit creditors and lower the cost of debt for two reasons (Klock, Mansi, and Maxwell, 2005). First, they help to reduce the uncertainty caused by a potential takeover and the eventuality of a leverage increase which damages the value of the existing debt. Second, the alignment of manager and shareholder interests can come at the expense of creditors. Overall, the effects of independent directors and antitakeover provisions on corporate credit risk during the pandemic remain an empirical question.

To the best of our knowledge, employee health policies have received a dearth of attention in COVID-19-related studies; it is, however, important to consider them. Before COVID-19, in response to rapidly escalating health-care costs and increased awareness of the influence of personal lifestyles on health and well-being, corporations implemented programs designed to promote employee health and support their productivity. In 'normal' pre-COVID-19 circumstances, such programs have positive impacts on productivity via a reduction in

absenteeism, disability, workers' compensation costs, and improvement in employee work performance or attendance (Serxner, Gold, Meraz and Gray, 2009). Programs such as these are even more important during the current COVID-19 pandemic. A large survey-based study by Wong et al. (2022) highlights that workplace measures and guidelines related to the COVID-19 pandemic are important means to minimize infection risk and operational disruptions in the workplace and effectively reduce stress and negative health outcomes for employees. Therefore, proactive health policies and measures should help to mitigate the increase in corporate credit risk.

Nevertheless, the implementation of employee health programs, such as providing employee healthcare training and education, arranging access to vaccines for employees, and adopting other infection-prevention and intervention measures, can certainly increase a firm's costs. If committed contributions to health programs account for a large portion of a firm's budget, its credit risk may escalate during a pandemic. Taken together, we expect to see a relatively smaller increase in CDS spreads during COVID-19 if the benefits of the firm's health program dominate its costs. We use three health support variables to test this hypothesis, i.e., employee health policy, employee health training, and supply-chain health policy.

3.4 Country Factors

Macroeconomic country-level controls, such as GDP, GDP growth, and foreign direct investment vary considerably across countries. Higher GDP or GDP growth increases a country's resilience to a crisis and is therefore expected to lower the credit risk of firms located in that country. Countries with greater foreign direct investments may be hurt more due to lockdown and travel restrictions during the pandemic. The level of government indebtedness can also be important. A country with limited fiscal capacity due to a high existing debt-to-GDP ratio is less financially flexible and less ready to support businesses during a major shock

like the COVID-19 pandemic via further borrowing on capital markets (Augustin et al., 2022). This problem is known as a debt overhang.

A country's level of political stability is also very important. Political stability is likely to affect a country's overall macroeconomic stability, and prior studies have shown that it can also determine whether the features of debt contracts remain valid (Rajan and Zingales, 2003; Roe and Siegel, 2011). Uncertainty associated with an unstable political environment is likely to harm investors' confidence in credit markets during the COVID-19 pandemic.

Finally, government restrictions via health and lockdown policies (such as school and workplace closures, travel bans, vaccination and testing policies, contact tracing, and face covering mandates), as well as government interventions to sustain the economy with some form of income support such as the replacement of lost salary, should have a direct impact on corporate credit risk and CDS spreads. In our analysis we consider three government policy measures: Income support, lockdowns, and health policies.

3.5 Data

CDS spreads are a frequently used measure of creditworthiness, as they reflect the cost of insuring against a firm's default losses. CDS spreads are standardized measures of credit risk compared to corporate bond spreads, which are affected by covenants, option features, structural illiquidity problems and taxation issues (e.g., Blanco, Brennan, and Marsh, 2005 and Augustin and Izhakian, 2020). Moreover, CDS spreads allow for a uniform cross-country comparison, as explained by Augustin, Subrahmanyam, Tang, and Wang (2014).

We source all CDS contract information from the global Markit database. For each country, we select the most liquid five-year maturity contract type to maximize the number of observations and firms available for the study. We retrieve all corporate financial data (described in section 3.2) for year 2019 from Compustat Global, with all financial items

measured in US dollars, and we obtain all firm-specific institutional features (described in section 3.3) for year 2019 from Refinitiv Eikon. We collect the country-level variables from the World Bank's 2019 World Development Indicators database and World Governance Indicators database. Information related to countries' COVID-19 policies are sourced from the website *Our World in Data*.

After matching all data sources, we obtain a final global sample of 655 firms on which CDS contracts have been written.[4] These firms are domiciled in 27 different countries. Table S2 in the Online Supplement describes our sample of firms (CDS reference entities) by country of domicile and by industry. The country with the largest number of firms is the United States (47.18%), followed by Japan (22.14%), United Kingdom (3.97%), France (3.66%), and Germany (3.66%). All industries are represented in our sample, but those with the largest number of firms are Industrials (21.53%), Consumer Discretionary (15.57%), and Materials (10.69%). We obtain data on COVID-19 cases from the website *Our World in Data*, which in turn sources the information from the Center for Systems Science and Engineering (CSSE) at The Johns Hopkins University (JHU). [5]

Following Augustin et al. (2022), we define $COVID19$ as the weekly change in the log COVID-19 infection rate in a country. For each country c in week t, $COVID19$ is measured as:

$$COVID19_{c,t} = \ln\left(Infection\ rate_{c,t}\right) - \ln\left(Infection\ rate_{c,t-1}\right) \quad (2)$$

where subscript c and t indicate country and week, respectively. $Infection\ rate_{c,t}$ represents the number of COVID-19 cases per million people in country c as of Friday in week t. This measure allows us to estimate the elasticity of firm credit risk to COVID-19 infection growth. Figure 1 shows the dynamics of the COVID-19 infection rates, measured as the weekly number of *new* infections per 1000 citizens, for Asia-Pacific, the Americas, and Europe during 2020.

[4] In Table S1 of the Online Supplement we provide a detailed explanation of the data-merging process that leads to our final sample.
[5] Data on the number of Covid-19 cases are available from January 22, 2020.

It demonstrates substantial differences in the severity and timing of the pandemic across geographic regions. While the Asia-Pacific region had an earlier onset, it shows a lower level of infections over the whole year, compared to big surges in the later months of 2020 in Europe and the Americas.

[Insert Figure 1 here]

Figure 2 shows the *cumulative* changes in log CDS spreads for our sample firms located in the three regions. The regional trends are largely aligned with each other. European firms have the highest cumulative increase in CDS spreads, followed by firms in the Americas. Firms in the Asia-Pacific region experience relatively smaller cumulative changes than the other two regions.

[Insert Figure 2 here]

Figure 3 presents a picture of the average weekly change in log CDS spreads spanning calendar year 2020. The figure shows eight major events corresponding to the peaks and troughs in log CDS spreads.

[Insert Figure 3 here]

Summary statistics are presented in Table 1. All variables have been winsorized at the 1% top and bottom percentiles. The average (median) CDS spreads for sample firms is 140 (71) basis points (bp). The average weekly change in log CDS spreads across the entire sample of firms is a modest 0.26% increase. In 2019, the average (median) firm had a leverage of 34% (32%), profitability ratio of 10.7% (9.8%), a level of cash holdings over total assets of about 9.5% (7.3%), and daily stock-return volatility of 1.8% (1.6%). Around half of the firms in the sample have an investment-grade credit rating. The average (median) distance to default is 3.7 (3.8), which translates into an average (median) probability of default of approximately 0.011% (0.006%). The average firm in our sample is around 3.7 standard deviations above the default threshold, as represented by its debt value.

[Insert Table 1 here]

Most firms explain how they engage with stakeholders and involve them in their decision-making process (69.5%), as well as some form of CSR report publication (85.1%). On a scale from 0 to 100, the average CSR score is 60.2; however, there is considerable variability in the sample (with a lower quartile of 39.7 and upper quartile of 83.9). In terms of variables related to firm-level corporate governance, the average board consists of 64.9% of independent directors and the average number of anti-takeover provisions is 3.8; 93.1% of firms have a policy to improve employee health and safety; 83.9% implement employee training on health and safety; and 62.3% have a policy to improve employee health and safety in their supply chain.

We next provide summary statistics of country variables at the country-week level. The average (median) weekly percentage change in the COVID-19 infection rate is 26.1% (7.6%). The average (median) country has a GDP growth rate of 1.68% (1.46%), the average (median) Debt-to-GDP ratio is 79.2% (62.1%), and the average (median) of foreign direct investments as a proportion of GDP is 3% (2%). The average (median) for the 'income support' variable is 1.35 (2), indicating that most of the countries in our sample provide some form of income support replacing less (more) than 50% of employees' lost salaries. The average (median) levels of the lockdown composite score and health policy composite score are 57 (62) and 56 (60) on a 100-point scale, respectively.

To visually gauge the impact of all firm-specific variables and policies on the sensitivity of CDS spreads to the weekly percentage increase in COVID-19 infections, we divide firms into terciles (within each country) by each firm characteristic and plot the cumulative change in log CDS spreads at the peak of the first wave of the COVID-19 crisis (the four weeks from

21st of February to 20th of March 2020) for firms in the lower and upper terciles.[6] As shown in Figure 4, during those weeks, firms that are larger, with higher leverage, non-investment-grade, lower profitability, higher cash holdings, higher stock volatility, higher managerial entrenchment, and without an employee health policy and stakeholder engagement policy experienced a greater increase in CDS spreads. These findings are broadly consistent with our expectations. Because many other factors, such as industry and country differences, can also affect CDS spreads, however, we next use a multivariate framework to examine the relation between firm characteristics and policies and the sensitivity of CDS spread changes to growth in COVID-19 infection rates.

[Insert Figure 4 here]

4. Empirical Results

4.1 Corporate Characteristics

We first analyze how changes in corporate CDS spreads relate to the changes in each country's COVID-19 infection rates and how this relationship varies depending on corporate financial characteristics. Results are reported in Table 2. In the first column, we only include $COVID19$ as the dependent variable to examine the univariate relation between weekly changes in log CDS spreads and percentage changes in infection rates. The estimated coefficient of $COVID19$ is 0.049 and highly significant at the 1% level (t=18.97). To draw a parallel with Augustin et al. (2022), we use a weekly percentage increase of 100% in the COVID-19 infection rate as our benchmark to gauge the economic magnitude of the impact.[7]

[6] Firm characteristics measured by indicator variables (investment grade, employee health policy and CSR) are grouped according to their indicator classification.

[7] Augustin et al. (2022) use a *daily* infection rate increase of 30% to express the economic magnitude of COVID-19. 30% represents the 92nd percentile of the daily increase in COVID-19 infection rate in their sample (the daily increase in infection rate is larger than 30% in 238 out of 2970 of their country-day observations). A 100% weekly increase represents the 92nd percentile of the *weekly* percentage change in COVID-19 infection rate in our sample (the weekly growth rate in infection rate is larger than 100% in 95 out of 1235 of our country-week observations).

The coefficient estimate of 0.049 suggests that a 100% increase in the weekly COVID-19 infection rate results in an average 4.9% increase in firm CDS spreads. Augustin et al. (2022) show that a 30% increase in the daily COVID-19 infection rate results in an average 2.1% increase in sovereign CDS spreads, which is comparable to the effect of COVID-19 on corporate CDS spreads. The adjusted R^2, 4.8% in our univariate regression shown in Table 2 column 1, is also comparable to 6% in the sovereign univariate regression of Augustin et al. (2022) (see column 1 of Table 3 in that paper).

[Insert Table 2 here]

Next, we examine how a firm's financial conditions affect its resilience to the COVID-19 crisis. In columns 2-8 of Table 2, we add the interactions of $COVID19$ with firm financial variables, together with firm, industry-time and country-time fixed effects.[8] This regression conditions out both time-varying and time-invariant industry and economy traits. We find that in non-investment grade, larger, highly levered firms with more volatile stocks, corporate credit risk is more sensitive to the intensity of the COVID-19 transmission rate. We observe a detrimental (rather than mitigating) effect of firm size on credit risk, suggesting that CDS market investors have concerns about large firms' ability to quickly adapt to the pandemic situation and survive the crisis. When all these variables are controlled simultaneously in column (8), stock volatility is no longer significant. The information contained in leverage and credit ratings is more relevant for CDS spread changes during the pandemic than is stock volatility.

These findings are not only statistically significant, but also economically meaningful. To illustrate, we compare firms with leverage of 45.3% (top quartile value - Q3) with firms

[8] Note that in columns 2-8 the $COVID19$ regressor is omitted because we control for industry- and country-week fixed effects, which are perfectly collinear with $COVID19$. Since there is only one value for each firm (2019 firm-financial value) and we include firm fixed effects, we cannot include firm variables by themselves (i.e., without interaction with $COVID19$) due to perfect collinearity. Our method is consistent with the model in Ding et al. (2021).

with leverage at the lowest quartile (Q1) of 21.4% in a country where COVID-19 infection rates double in a week (100% increase). Looking at the results in column 8 of Table 2, the estimated coefficient for *Leverage* × *COVID19* (0.052, t=3.22) indicates that firms with higher leverage would experience a percentage increase in weekly CDS spreads of 2.36% (=0.052 × 0.453 × 100%), 1.25% larger than the increase of 1.11% for firms with lower leverage (=0.052 × 0.214 × 100%). Such a difference is large, given that the mean weekly change in CDS spreads is 0.26%.

Similarly, the coefficient estimate of *Size* × *COVID19* (0.008) indicates that a 100% increase in COVID-19 infections for a firm with log total assets ratio prior to COVID-19 equal to 10.767 (Q3) would bring the rise in the pandemic-induced weekly CDS spreads to 8.61% (= 0.008 × 10.767 × 100%), an extra 1.27% if compared with firms in the lowest quartile (Q1) size value of 9.143. An investment-grade firm would see an average increase in CDS spreads that is 1% (= − 0.010 × 100%) lower than a speculative-grade firm.

4.2 Firm Policies

In this section, we assess whether firm policies affect CDS reactions to COVID-19. Table 3 reports the regression results.[9] In column 1, the coefficient of the interaction terms between $COVID19$ and *Stakeholder engagement* is negative and significant at the 1% level after controlling for all regressors used in Table 2, indicating that the CDS market views stakeholder engagement positively because it makes firms more resilient to the COVID-19 shock. In terms of economic significance, if a firm involves its stakeholders in its decision-making process, then the average change in its pandemic-induced weekly CDS spreads after the infection rate doubles in a week is 1.8% (= − 0.018 × 100%) *lower* than that of other firms, *ceteris paribus*.

[Insert Table 3 here]

[9] To save space, we report one proxy only for each of the three categories of corporate policies (CSR, corporate governance, and health policies). The results for other proxies are reported in Table S3 in the Online Supplement.

In a similar spirit, we explore the impact of the corporate governance strength on a firm's CDS spread reaction to the spread of COVID-19. Column 2 shows that the interaction term between *Antitakeover provisions* and $COVID19$ has a positive and significant coefficient. To gauge the magnitude of the economic impact, a firm with the highest quartile of *Antitakeover provisions* (6.00) is associated with a pandemic-induced increase in the weekly CDS spread percentage change of 1.8% (= 0.003 × 6 × 100%), which is 1.2% larger than the increase for a firm at Q1 level (2.00). Our results suggest that CDS spreads of firms with antitakeover provisions are more sensitive to an increase in infection rates. This finding echoes the result of Ding et al. (2021) for stocks and the notion that antitakeover defenses increase managerial entrenchment during a crisis period (Johnson, Boone, Breach, and Friedman, 2000).

We now examine how a firm's employee health policies affect CDS spread reactions to the growth in COVID-19 infection rates. Results are reported in column 3. The coefficient of the interaction terms between $COVID19$ and *Employee health policy* are negative and significant. For a weekly 100% growth in infections, our estimates show that, if a firm had an employee health policy in place before COVID-19, the average pandemic-induced rise in its weekly CDS spreads is 1.9% (= − 0.019 × 100%) *lower* than that of other firms, *ceteris paribus*. This result indicates that credit markets perceive that the benefits of an employee health program on a firm's credit risk during the pandemic dominates the cost of having such programs. A firm's commitment to safeguarding its employees' health helps preserve their loyalty and maintains their productivity, which makes the firm more resilient during the disruptions caused by COVID-19.

Inspired by Ding et al.'s (2021) study of stocks around the world, we have set out to examine the impact of the spread of COVID-19 on firm CDS spreads looking at the interactions of $COVID19$ with different sets of regressors. Technically, however, if all these interaction variables are material determinants of CDS spread changes, then regressions excluding any of

these variables are potentially mis-specified. Therefore, in column 4, we examine all firm financial characteristics and policies simultaneously and present a single main regression specification at the firm level. We find that most firm characteristics and policies show estimated coefficients and significance levels similar to earlier results. Since employee health policy becomes insignificant once we control for CSR performance and corporate governance, it is also possible that firms with employee health policies are more advanced in these other two policy dimensions as well.

In column 6, to simplify our rich model specification reported in column 5, we use distance to default (Bharath and Shumway, 2008) to subsume other firm-level default predictors (leverage, stock volatility and the investment-grade dummy). Distance to default approximately measures the distance between the firm's expected asset value and the default threshold (the firm's debt value) in units of firm volatility. This variable has a negative and strongly significant coefficient (−0.009, t= −3.6). The results for other variables are similar. For model parsimony, we use distance to default as our main firm-default predictor in further regressions in the following sections.

4.3 Robustness Checks

We now conduct several robustness checks. In column 1 of Table 4 we add currency-time fixed effects to control for exchange rate movements, as the CDS contracts in our sample are denominated in different national currencies. Our findings remain qualitatively unchanged even with currency-time fixed effects included.

[Insert Table 4]

Furthermore, as the growth rate in COVID-19 cases is very persistent, we replace our $COVID19$ measure with weekly changes in the number of *new* COVID-19 cases within countries. This measure should better capture *unanticipated* weekly surprises in the spread of COVID-19. We present this result in column 2 of Table 4. Our main findings continue to hold.

In column 3 of Table 4 we add a control for weekly stock returns in the regression to account for information already captured within stock markets, and we find that the remaining firm characteristics continue to be statistically significant, even if stock returns are strongly significant to explain CDS spread changes. This result affirms that contemporaneous stock returns do not fully reflect all information driving CDS spread changes.

Next, we examine whether the credit market is sensitive to debt rollover risk during the pandemic. As argued by Liu et al. (2021), the sharp reduction in cash flow caused by the COVID-19 crisis exacerbates debt rollover risk for firms with a large amount of imminent debt repayment and insufficient cash reserves. To meet their upcoming debt payment obligations, these firms must roll over their maturing debt to future periods. Moreover, it may be difficult for them to find alternative refinancing sources, given that it is costly to acquire external financing during the market downturns caused by COVID-19.

In column 4 of Table 4 we consider the impact of *Debt rollover risk* (defined as debt due in one year divided by cash holdings). Our sample size is reduced by 15% due to lack of data availability. The coefficient of debt rollover risk interacted with COVID-19 is negative but not significant. However, we find that the coefficient of the three-way interaction term *Debt Rollover Risk* × *Low Distance to Default* × $COVID19$ is positive (0.003) and significant at the 1% level. *Low Distance to Default* is a dummy variable that equals 1 when a firm is in the lowest quartile of the distance-to-default distribution (i.e., close to default). This result is consistent with Liu, Qiu, and Wang's (2021) results for U.S. firms, indicating that, globally, riskier firms with higher default probability face a larger pandemic-induced increase in their CDS spreads if they have greater difficulty to roll over their debt.

Thus far, in our regression specifications in Tables 2, 3, and 4, *Cash holding* × *COVID19* is consistently insignificant. Cash holdings during COVID-19 should be beneficial for more distressed firms. In column 5 of Table 4 we test whether higher cash reserves can ameliorate

the increase in CDS spreads during the pandemic for firms closer to default. We add the interaction variable *Cash holding* × *Low Distance to Default* × $COVID19$ and find that its estimated coefficient is indeed negative (-0.136) and statistically significant at the 5% level.

Finally, in column (6) we control for industry exposure to COVID-19. The COVID-19 pandemic has affected some industries more than others. Businesses that rely heavily on face-to-face communication or close physical proximity when manufacturing a product or providing a service are especially vulnerable to social-distancing interventions. We therefore examine how firms' industry exposure to COVID-19 affects CDS spread changes. We employ the measure developed by Koren and Peto (2020) for 49 industries based on the reliance of each industry on human interaction, face-to-face communication, or close physical proximity between workers. We interact the $COVID19$ variable with the degree of industry exposure to COVID-19. As shown in column (6), the industry exposure regressor is positive and statistically significant, affirming that firms in industries more exposed to COVID-19 experience a larger pandemic-induced increase in weekly CDS spreads than other firms.

4.4 Country-level Characteristics and Policies

Our international setting allows us to investigate whether certain *country-level* characteristics and government policies help mitigate the adverse effect of COVID-19 on firm credit risk. Specifically, we examine interactions between pre-pandemic country-level features including GDP, GDP growth, debt to GDP ratio, foreign direct investments, and political stability and the *COVID-19* variable. We also control for time-varying government policies adopted during the pandemic, such as income support, lockdowns, and health policies.

Table 5 presents the results of this analysis. As country-time fixed effects would not be identified in this specification, we reintroduce COVID19 as an explanatory variable. In column 1 we show that, as expected, firms domiciled in more politically stable countries with higher GDP and GDP growth rates and lower foreign direct investments are hit less hard during

the COVID-19 pandemic. GDP and political stability carry greater economic significance. For a 100% weekly change in COVID-19 infection rates, firms in countries in the top quartile of GDP and political stability see respectively a 2.4% (= −0.014 × 28.484 × 100 + 0.014 × 26.787 × 100%) and 3.8% (= −0.046 × 1.030 × 100% + 0.046 × 0.206 × 100%) *lower* pandemic-induced weekly CDS spread change compared to firms in the bottom quartile. Foreign direct investments enter with a positive estimated coefficient in the regression, showing that the pandemic exerts a more harmful impact on countries with higher external reliance and greater international exposure. However, its economic impact is limited. Firms in countries in the top quartile of foreign direct investments experience a 0.36% (= 0.189 × 0.032 × 100 − 0.189 × 0.013 × 100%) *higher* CDS spread increase than those in countries in the bottom quartile. After controlling for country-level factors, we observe that firm-specific characteristics and health support policies remain significant.

[Insert Table 5 here]

While the impact of government fiscal capacity (*Debt to GDP*) on firm credit risk seems muted, we explore whether higher indebtedness at the country level can amplify the negative effect of a firm's individual level of default risk on the sensitivity of its CDS spreads to COVID-19. In column 2 of Table 5, we interact $COVID19$ with the dummy variables *High Debt to GDP* and *Lower Distance to Default* and find that the triple-interaction term enters the regression with a positive sign and is significant at the 5% level. This result shows that CDS reactions to COVID-19 are stronger for riskier firms domiciled in countries with higher debt-to-GDP ratios. Therefore, weak government fiscal capacity can worsen corporate credit risk during pandemics due to an *amplification* effect when countries face greater fiscal constraints *and* firms have higher levels of default risk. Our result complements the finding of Augustin et al. (2022) regarding the significant impact of fiscal capacity on *sovereign* risk during the

COVID-19 crisis and shows that the fiscal burden extends beyond sovereign debt to adversely affect corporate credit risk as well.

In columns 3 to 5 we examine the effect that key government policies (income support, lockdowns, and health policies) have on firm credit risk during the pandemic. We show that, *ceteris paribus*, firms domiciled in countries that introduce larger income-support initiatives and stricter lockdown and health policies (such as vaccination and testing policies, contact tracing, and face-covering mandates) experience muted increases in their CDS spreads during the pandemic period. Column 6 presents the regression results when country policies are controlled simultaneously. In terms of economic magnitude, health and lockdown policies taken together have a stronger effect than income-support policies. Firms in countries with more stringent health and lockdown policies equivalent to the upper quartile value of the variable (0.664) - *ceteris paribus* - have on average CDS spreads that are 0.67% (= − 0.037 × 0.664 + 0.037 × 0.482) lower than firms in countries that adopt more limited health and lockdown policies equivalent to the lowest quartile value (0.482). The corresponding number for income-support policies is 0.08% (= −0.008 × 2 + 0.008 × 1). Stricter lockdown policies and health policies have a stronger mitigating impact on CDS spreads than income-support policies. While some business owners and firm executives claim these restrictive measures damage their business, the empirical evidence indicates that on average credit markets consider them to be beneficial during a pandemic, since the enduring intensity of the health shock can significantly weaken firms' fundamentals and drive them to bankruptcy.

The above analysis has implications for government policy trade-offs in response to an external shock such as the COVID-19 pandemic. On the one hand, credit markets perceive income-support policies as buoyant news that can to some extent alleviate corporate default risk and provide immediate economic support; on the other hand, however, an out-of-control

enlargement of government debt may cause counter-productive consequences to local private businesses that increase default risk in the longer term.

Finally, we address the reverse-causality concern that countries with less favorable financial conditions have less financial flexibility in implementing polices to support businesses and protect citizens and, hence, infection rates in these countries can grow more rapidly. We use two approaches to alleviate this concern. First, we repeat our analysis by focusing on the period before the week ending on the 13th of March 2020, because most countries only started introducing policies to reduce infection rates and support affected firms after that week. Moreover, this check further ensures the robustness of our results against persistency in the COVID-19 cases growth measure, since the growth rate of COVID-19 was much less persistent during the initial outbreak of the virus. We present the results in Panel A of Table S4 in the Online Supplement. Our findings remain largely unchanged.

Second, we follow Augustin et al. (2022) and examine whether poorer and more indebted countries have less financial flexibility to implement COVID-19 policies to lower infection rates in a timely manner. We present our findings in Panel B of Table S4 in the Online Supplement. The results show that the speed of policy implementation related to school and workplace closures and income support is not associated with a country's GDP or debt levels, suggesting that the reverse-causality concern is unlikely to drive our findings.

Our study reveals the relevance of a variety of firm and country characteristics on COVID-19-induced CDS spread changes. To facilitate a comparison of the relative importance of these factors, we summarize each factor's economic impact in Table 6. For a country where the COVID-19 infection rate increases by 100% in a week, we calculate the difference in pandemic-induced weekly CDS spread changes between firms with the value of characteristics in the top quartile (Q3) and those in the bottom quartile (Q1) and report the statistical significance. We find that statistically significant firm traits are important in the following

order of economic impact: (firm) size, stakeholder engagement, leverage (and distance to default), and antitakeover provisions. Regarding country-level features, political stability carries the greatest economic impact, followed by GDP, GDP growth, and foreign direct investment, indicating that the strength and stability of the business environment is crucial to support the corporate sector.

[Insert Table 6]

Overall, both firm-specific and country-wide factors are important in explaining corporate credit risk, consistent with Lee, Naranjo and Sirmans' (2016) finding that certain firm characteristics can help delink firm credit risk from their sovereign and country risks.

4.5 A Comparison of CDS Market and Stock Market Reactions to COVID-19

The COVID-19 pandemic also offers us an ideal, albeit unfortunate, opportunity to revisit the information incorporated in the CDS market vis-a-vis the stock market. Past evidence shows some distinct reactions of CDS and stock markets to corporate and economic announcements and events. Some studies find that CDS spreads can incorporate certain types of new information more efficiently and quickly than stock and bond prices, especially during negative credit events and when firm-specific credit information is prominent (e.g., Blanco, Brennan, and Marsh, 2005; Jorion and Zhang, 2007; Lee, Naranjo, and Velioglu, 2018).

Marsh and Wagner (2016) show, however, that CDSs are slower than are stocks in pricing "common" systematic information prominent during a global financial crisis. After the 2008 financial crisis, new regulations enhancing reporting and transparency of CDS trades (e.g., mandatory trade execution on exchanges and central clearing) were introduced in the United States (the Dodd-Frank Act) and Europe (European Market Infrastructure Regulation). Recent studies claim that these regulations reduced the informational advantage of the single-name corporate CDSs vis-a-vis stocks (e.g., Marra, Yu, and Zhu, 2019).

To examine the relative efficiency of CDS and stock market reactions to COVID-19, we run regressions for CDS spread changes at the daily instead of weekly frequency by including lagged and contemporaneous stock returns as independent variables in our specifications and, in parallel, we conduct regressions for stock returns by including lagged and contemporaneous CDS spreads as independent variables.

The results presented in Table 7 show that, after controlling for all firm-specific determinants used in the previous analysis, two-way information flows occur between the stock and CDS markets during the pandemic. As shown in columns 2 and 3, CDS spread changes can be explained by past and contemporaneous stock returns; whilst stock returns can also be explained by past and contemporaneous CDS spread changes (columns 5 and 6).

[Insert Table 7 here]

Table 7 also allows us to run a comparison between stock and CDS reactions to COVID-19 and how they change according to firm characteristics in an international setting. We find that several firm-specific variables remain significant in explaining the sensitivity of CDS spread changes to COVID-19 at the daily frequency, even after controlling for contemporaneous or lagged stock returns. Looking at columns 1 and 4, we observe that the interactions between $COVID19$ and firm size, leverage, investment-grade status, and stakeholder engagement are statistically significant for CDS spread changes but not for stock returns, while the interactions of *COVID19* with profitability and stock volatility are significant for stock returns but not for CDS spread changes. Our results show a more pronounced impact of leverage on corporate credit risk than on stock returns, consistent with the Merton (1974) credit-risk model. The strong significance of stakeholder engagement in the CDS model suggests that CSR performance is viewed positively by credit-market investors during the COVID-19 period.

Overall, our results illustrate that the CDS and stock markets incorporate somewhat different sets of information. While the stock-market response to the COVID-19 shock seems primarily driven by firm profitability and volatility, the CDS market reaction seems to reflect a reassessment of credit risk also based on firm assets, leverage, and CSR performance.[10]

5. Conclusions

In this paper we examine the reaction of global corporate CDS spreads to the COVID-19 pandemic for 655 firms from different industries located in 27 countries. The study illustrates a pandemic-induced increase in corporate CDS spreads, which is more pronounced for firms that are larger, with higher leverage, and are closer to the default threshold. Firms with stronger CSR performance, better corporate governance, and operating in industries less affected by social distancing constraints experience a smaller increase in CDS spreads. Our findings can be useful for CDS and bond investors' portfolio allocations and risk-management decisions and for corporate managers to mitigate firm credit risk in response to a major health crisis.

Firms in countries with higher GDP and GDP growth, higher political stability, and lower foreign direct investments experience smaller increases in CDS spreads in response to COVID-19. Government policies, including income-support packages, as well as lockdowns and other mandated health policies during the pandemic help to mitigate the adverse effect of COVID-19 on corporate CDS spreads. The positive assessment of these policies by the credit markets shows that investors view them as a means of alleviating the adverse impact of an external shock that can lead firms towards financial distress and even push them to default. Our

[10] In Table 7, we find fewer significant variables in the stock regressions than in Ding et al. (2021). For instance, cash and leverage are significant for stock returns in their study (Table 7) but not in ours. However, the two sets of results are obtained using different samples of countries (our sample is smaller than theirs due to CDS data availability), different sample periods (our sample is longer than theirs), some different controls in the respective model specifications (importantly, they do not control for CDS returns), and different use of robust standard errors (they use standard errors clustered at the country level, we use standard errors clustered at the firm level).

finding that firms with greater default risk experience a worse reaction to the pandemic in countries with lower fiscal capacity indicates the existence of a negative amplification effect. This result carries some important policy implications. Policies of economic support to businesses can help mitigate the increase in corporate credit risk; however, government debt and political stability must be carefully managed to avoid exacerbating the adverse reactions to the prolonged COVID-19 crisis for risky local businesses.

Our analysis demonstrates two-way information flows between the CDS and stock markets during the pandemic, suggesting that the CDS market plays an important information discovery role beyond the stock market. The CDS market incorporates distinct information on corporate characteristics and existing policies and responds directly to the spread of COVID-19. While the stock market is mostly affected by 'cash-flow news' driven by changes in profitability and volatility, the CDS market is more sensitive to features affecting firms' default risk.

References

Acharya, V., S. A. Davydenko, and I. A. Strebulaev (2012), Cash Holdings and Credit Risk, *Review of Financial Studies*, 25, 3572–3609.

Acharya, V., and S., Steffen (2020), The Risk of Being a Fallen Angel and the Corporate Dash for Cash in the Midst of COVID, *Review of Corporate Finance Studies*, 9, 430–471.

Albuquerque, R. A., Y., Koskinen, C., Zhang (2019), Corporate Social Responsibility and Firm Risk: Theory and Empirical Evidence, *Management Science*, 65, 4451–4469.

Albuquerque, R. A., Y., Koskinen, S., Yang, C., Zhang (2020), Resiliency of Environmental and Social Stocks: An Analysis of the Exogenous COVID-19 Market Crash, *Review of Corporate Finance Studies*, 9, 593–621.

Anginer, D., A., Demirguc-Kunt, H., Huizinga, and K., Ma (2018), Corporate Governance of Banks and Financial Stability, *Journal of Financial Economics*, 130, 327–346.

Armstrong, C., J. E. Core, and W. R. Guay (2014). Do independent directors cause improvements in firm transparency?, *Journal of Financial Economics*, 113, 383–403.

Augustin, P., Subrahmanyam, M. G., Tang, D. Y., and Wang, S. Q. (2014). Credit Default Swaps: A Survey, *Foundations and Trends in Finance*, 9, 1–196.

Augustin, P., and Y., Izhakian (2020), Ambiguity, Volatility, and Credit Risk, *Review of Financial Studies*, 33, 1618–1672.

Augustin, P., and V., Sokolovski, M. G., Subrahmanyam, and D., Tomio (2022), In Sickness and in Debt: The COVID-19 Impact on Sovereign Credit Risk, *Journal of Financial Economics*, 143, 1251-1274.

Baker, S. R., N., Bloom, S. J., Davis, K., Kost, M., Sammon, and T., Viratyosin (2020), The Unprecedented Stock Market Reaction to Covid-19, *Review of Asset Pricing Studies*, 10, 742–758.

Bates, T. W, K. M. Kahle, R. M. Stulz (2009), Why Do U.S. Firms Hold So Much More Cash than They Used To? *Journal of Finance*, 64, 1985-2021.

Bebchuk, L., and A., Cohen (2005), The Costs of Entrenched Boards, *Journal of Financial Economics*, 78, 409–433.

Bhojraj, S., and P., Sengupta (2003), Effect of Corporate Governance on Bond Ratings and Yields: The Role of Institutional Investors and Outside Directors, *Journal of Business*, 76, 455–475.

Black, F. and M. Scholes (1973), The Pricing of Options and Corporate Liabilities, *Journal of Political Economy*, 81, 637–654.

Blanco, R., S., Brennan, and I.W., Marsh (2005), An Empirical Analysis of the Dynamic Relation between Investment-grade Bonds and Credit Default Swaps, *Journal of Finance*, 60, 2255–2281.

Chen, Y.-C., M., Hung, and Y., Wang (2018), The Effect of Mandatory CSR Disclosure on Firm Profitability and Social Externalities: Evidence from China, *Journal of Accounting and Economics*, 65, 169–190.

Cameron, A.C, and D. L., Miller (2015), A Practitioner's Guide to Cluster-Robust Inference, *Journal of Human Resources*, 50, 317-372.

Cremers, K. J. M., and V. B., Nair (2005), Governance Mechanisms and Equity Prices, *Journal of Finance*, 60, 2859–2894.

Ding, W., R., Levine, C., Lin, and W., Xie (2021), Corporate Immunity to the COVID-19 Pandemic, *Journal of Financial Economics*, 141, 802-830.

El Ghoul, S., O., Guedhami, C., Kwok, and D., Mishra (2011), Does Corporate Social Responsibility Affect the Cost of Capital?, *Journal of Banking and Finance*, 35, 2388–2406.

Ericsson, J., K., Jacobs, and R., Oviedo (2009), The Determinants of Credit Default Swap Premia. *Journal of Financial and Quantitative Analysis*, 44, 109–132.

Fahlenbrach, R., K., Rageth, and R. M., Stulz (2021), How Valuable is Financial Flexibility when Revenue Stops? Evidence from the COVID-19 Crisis, 34(11), *Review of Financial Studies*, 5474–5521.

Falato, A., Goldstein, I., Hortaçsu, A. (2021). Financial Fragility in the COVID-19 Crisis: The Case of Investment Funds in Corporate Bond Markets, *Journal of Monetary Economics*, 123 (October), 35-52.
Feng, Z. Y., C. R., Chen, and Y. J., Tseng (2018), Do Capital Markets Value Corporate Social Responsibility? Evidence from Seasoned Equity Offerings, *Journal of Banking and Finance*, 94, 54–74.

Fields, L. P., D. R., Fraser, and A., Subrahmanyam (2012), Board Quality and the Cost of Debt Capital: The Case of Bank Loans. *Journal of Banking and Finance*, 36, 1536–1547.

Haddad, V., Moreira, A., Muir, T. (2021). When Selling Becomes Viral: Disruptions in Debt Markets in the COVID-19 Crisis and the Fed's Response, *Review of Financial Studies*, 34, 5309-5351.
Johnson, S., P., Boone, A., Breach, and E., Friedman (2000), Corporate governance in the Asian financial crisis, *Journal of Financial Economics*, 58, 141–186.

Jorion, P., and G., Zhang (2007), Good and Bad Credit Contagion: Evidence from Credit Default Swaps, *Journal of Financial Economics*, 84, 860–883.

Klock, M.S., S.A., Mansi, and W.F., Maxwell (2005), Does Corporate Governance Matter to Bondholders?, *Journal of Financial and Quantitative Analysis*, 40, 693–719.

Koren, M., and R., Pető (2020), Business Disruptions from Social Distancing, *PLoS ONE*, 15, e0239113.

Lee, J., A., Naranjo, and S. Sirmans (2016), Exodus from Sovereign Risk: Global Asset and Information Networks in the Pricing of Corporate Credit Risk, *Journal of Finance*, 71, 1813-1856.

Lee, J., A., Naranjo, and G., Velioglu (2018), When do CDS Spreads Lead? Rating Events, Private Entities, and Firm-specific Information Flows, *Journal of Financial Economics*, 130, 556–578.

Lins, K. V., H., Servaes, and A., Tamayo (2017), Social Capital, Trust, and Firm Performance: the Value of Corporate Social Responsibility during the Financial Crisis, *Journal of Finance*, 72, 1785–1824.

Liu, Y., B., Qiu, and T., Wang (2021), Debt Rollover Risk, Credit Default Swap Spread and Stock Returns: Evidence from the COVID-19 Crisis, *Journal of Financial Stability*, 53.

Marra, M., F., Yu, and L., Zhu (2019), The Impact of Trade Reporting and Central Clearing on CDS Price Informativeness, *Journal of Financial Stability*, 43, 130–145.

Marsh, I.W., and W., Wagner (2016), News-Specific Price Discovery in Credit Default Swap Markets, *Financial Management*, 45, 315–340.

Masulis, R. W., and S. W., Reza (2015), Agency Problems of Corporate Philanthropy, *Review of Financial Studies*, 28, 592–636.

Merton, R. C. (1974). On the Pricing of Corporate Debt: The Risk Structure of Interest Rates, *Journal of Finance*, 29, 449–470.

O'Hara, M., and Zhou, X.A. (2021). Anatomy of a Liquidity Crisis: Corporate Bonds in the COVID-19 Crisis. *Journal of Financial Economics*, 142, 46-68.
Rajan, R. G., and L. Zingales (2003), The great reversals: The politics of financial development in the twentieth century, *Journal of Financial Economics* 69, 5–50.

Ramelli, S., and A. F., Wagner (2020), Feverish Stock Price Reactions to Covid-19, *Review of Corporate Finance Studies*, 9, 622–655.

Roe, M. J., and J. I. Siegal (2011), Political instability: Effects of financial development, roots in the severity of economic inequality, *Journal of Comparative Economics*, 39, 279–309.

Shleifer, A., and R. W., Vishny (1997), A Survey of Corporate Governance, *Journal of Finance*, 52, 737–783.

Serxner, S., D., Gold, A., Meraz, and A., Gray (2009), Do Employee Health Management Programs Work?, *American Journal of Health Promotion*, 23(4), 1–8.

Thompson, B. T. (2011), Simple Formulas for Standard Errors that Cluster by both Firm and Time, *Journal of Financial Economics*, 99, 1 -10.

Vuolteenaho, T. (2002), What Drives Firm-Level Stock Returns?, *Journal of Finance*, 57, 233-264.

Wong, E. L.-Y., K.-F., Ho, S. Y.-S., Wong, A. W.-L., Cheung, P. S.-Y., Yau, D., Dong, and E.-K., Yeoh (2022), Views on Workplace Policies and its Impact on Health-Related Quality of Life During Coronavirus Disease (COVID-19) Pandemic: Cross-Sectional Survey of Employees, *International Journal of Health Policy and Management*,11(3), 344-353.

Table 1: Summary statistics

This table reports the summary statistics for the full sample. All continuous variables are winsorized at the 1st and 99th percentile levels. All variables are defined in Appendix A.

Firm-level variables	Mean	Std. dev.	Q1	Median	Q3
CDS spread (bps)	140.009	202.171	39.156	70.596	140.035
Weekly change in log CDS spread (%)	0.264	11.808	-2.607	-0.002	1.404
Weekly stock return (%)	-0.224	7.435	-3.349	0.117	3.563
Size	10.045	1.270	9.143	9.899	10.767
Leverage	0.340	0.175	0.214	0.319	0.453
Debt rollover risk	0.789	2.540	0.102	0.255	0.621
Investment grade	0.488	0.500	0.000	0.000	1.000
Profitability	0.107	0.054	0.071	0.098	0.137
Cash holding	0.095	0.082	0.036	0.073	0.126
Stock volatility	0.018	0.010	0.013	0.016	0.020
Distance to default	3.696	1.167	3.086	3.849	4.549
Stakeholder engagement	0.695	0.461	0.000	1.000	1.000
CSR reporting	0.851	0.356	1.000	1.000	1.000
CSR strategy score	0.602	0.309	0.397	0.674	0.839
Antitakeover provisions	3.791	2.560	2.000	4.000	6.000
Independent Directors	0.649	0.272	0.429	0.769	0.889
Employee health policy	0.931	0.253	1.000	1.000	1.000
Employee health training	0.839	0.368	1.000	1.000	1.000
Supply chain health policy	0.623	0.485	0.000	1.000	1.000
Industry exposure to COVID19	3.248	0.598	2.890	3.091	3.761
Country-level variables					
COVID19	0.261	0.490	0.026	0.076	0.214
GDP	27.741	1.085	26.787	27.901	28.484
GDP growth (%)	1.682	1.331	0.929	1.463	1.950
Debt to GDP	0.792	0.484	0.421	0.621	0.981
Foreign direct investment	0.030	0.056	0.013	0.020	0.032
Political stability	0.472	0.626	0.206	0.481	1.030
Income Support	1.354	0.754	1.000	2.000	2.000
Lockdown Policies	0.574	0.207	0.444	0.620	0.727
Health and Lockdown Policies	0.555	0.163	0.482	0.595	0.664

Table 2: Corporate characteristics and COVID-19-induced CDS spread changes

This table reports regression results on the relation between corporate characteristics and the reaction of CDS spread changes to changes in COVID-19 infection rates. The dependent variable is the weekly change in log CDS spreads for each firm. COVID19 is the weekly percentage change in COVID-19 infection rates in a country. All variables are defined in Appendix A. T-statistics are calculated from robust standard errors clustered by firm and are displayed in parentheses. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively.

Dep. = ΔCDS Spreads	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
COVID19	0.049***							
	(18.967)							
Size × COVID19		0.004*						0.008***
		(1.958)						(3.393)
Leverage × COVID19			0.046***					0.052***
			(3.244)					(3.217)
Investment grade × COVID19				-0.010*				-0.010*
				(-1.841)				(-1.771)
Profitability × COVID19					-0.063			-0.084
					(-1.543)			(-1.503)
Cash holding × COVID19						-0.006		0.015
						(-0.287)		(0.553)
Stock volatility × COVID19							0.970**	0.293
							(2.376)	(0.697)
Firm fixed effects	N	Y	Y	Y	Y	Y	Y	Y
Industry-time fixed effects	N	Y	Y	Y	Y	Y	Y	Y
Country-time fixed effects	N	Y	Y	Y	Y	Y	Y	Y
Number of observations	29119	29119	29119	29119	29119	29119	29119	29119
Adjusted R^2	0.048	0.327	0.328	0.327	0.327	0.326	0.327	0.355

Table 3: Corporate policies and COVID-19-induced CDS spread changes

This table reports regression results on the relation between corporate policies and the reaction of CDS spreads to changes in COVID-19 infection rates. Corporate policies include corporate social responsibility performance (stakeholder engagement), corporate governance (number of antitakeover provisions, and employee health policies. The dependent variable is the weekly change in log CDS spreads for each firm. COVID19 is the weekly percentage change in COVID-19 infection rates in a country. All variables are defined in Appendix A. T-statistics are calculated from robust standard errors clustered by firm and are displayed in parentheses. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively.

Dep. = ΔCDS Spreads	(1)	(2)	(3)	(4)	(5)
Stakeholder engagement × COVID19	-0.018***			-0.015**	-0.017***
	(-2.982)			(-2.399)	(-2.711)
Antitakeover provisions × COVID19		0.003**		0.003*	0.003*
		(2.035)		(1.841)	(1.802)
Employee health policy × COVID19			-0.019*	-0.012	-0.012
			(-1.667)	(-1.055)	(-0.970)
Size × COVID19	0.010***	0.009***	0.009***	0.011***	0.010***
	(4.158)	(3.674)	(3.629)	(4.385)	(4.113)
Leverage × COVID19	0.050***	0.053***	0.054***	0.052***	
	(3.132)	(3.278)	(3.352)	(3.269)	
Stock volatility × COVID19	0.267	0.304	0.310	0.292	
	(0.631)	(0.713)	(0.746)	(0.686)	
Investment grade × COVID19	-0.008	-0.009	-0.009	-0.007	
	(-1.410)	(-1.646)	(-1.603)	(-1.240)	
Profitability × COVID19	-0.073	-0.078	-0.083	-0.069	0.001
	(-1.307)	(-1.424)	(-1.499)	(-1.263)	(0.012)
Cash holding × COVID19	0.018	0.016	0.009	0.014	0.014
	(0.653)	(0.594)	(0.340)	(0.531)	(0.546)
Distance to default × COVID19					-0.009***
					(-3.601)
Firm fixed effects	Y	Y	Y	Y	Y
Industry-time fixed effects	Y	Y	Y	Y	Y
Country-time fixed effects	Y	Y	Y	Y	Y
Number of observations	29119	29119	29119	29119	29119
Adjusted R^2	0.356	0.355	0.355	0.356	0.356

Table 4: Robustness tests

This table reports various robustness checks for regression results on the relation between all corporate characteristics and policies and the reaction of CDS spread changes to changes in COVID-19 infection rates. The dependent variable is the weekly change in log CDS spreads for each firm. COVID19 is the weekly percentage change in COVID-19 infection rates in a country. All variables are defined in Appendix A. T-statistics are calculated from robust standard errors clustered by firm and are displayed in parentheses. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively.

Dep. = ΔCDS Spreads	(1) Model includes currency-time fixed effects	(2) COVID19 = Change in number of *new* cases	(3) Model adds control for weekly stock return	(4) Model adds interaction between debt rollover risk and distance to default	(5) Model adds interaction between cash holding and distance to default	(6) Controls for industry exposure to COVID19
Size × COVID19	0.010***	0.007***	0.010***	0.011***	0.009***	0.012***
	(4.113)	(3.999)	(4.464)	(4.371)	(4.061)	(5.263)
Distance to default × COVID19	-0.009***	-0.486***	-0.008***			-0.009***
	(-3.601)	(-2.807)	(-3.485)			(-3.557)
Profitability × COVID19	0.001	-0.014	0.009	-0.036	-0.047	-0.035
	(0.012)	(-0.339)	(0.157)	(-0.616)	(-0.870)	(-0.654)
Cash holding × COVID19	0.014	0.003	0.016	0.000	0.034	0.037
	(0.546)	(0.161)	(0.609)	(0.006)	(1.133)	(1.300)
Stakeholder engagement × COVID19	-0.017***	-0.013***	-0.017***	-0.020***	-0.018***	-0.018***
	(-2.711)	(-2.620)	(-2.740)	(-2.864)	(-2.883)	(-2.887)
Antitakeover provisions × COVID19	0.003*	0.191*	0.003*	0.003**	0.003*	0.002*
	(1.802)	(1.712)	(1.763)	(2.317)	(1.938)	(1.654)
Employee health policy × COVID19	-0.012	-0.007	-0.012	-0.002	-0.009	-0.003
	(-0.970)	(-0.701)	(-0.939)	(-0.148)	(-0.690)	(-0.239)
Industry exposure to COVID-19 × COVID19						0.013**
						(2.577)
Weekly stock return			-0.201***			
			(-6.875)			
Debt rollover risk * COVID19				-0.005		
				(-0.106)		
Low Distance to default × Debt rollover risk * COVID19				0.269**		
				(2.302)		
Low Distance to default × Cash holding * COVID19					-0.136**	
					(-2.222)	
Low Distance to default × COVID19				0.017**	0.025***	
				(2.466)	(3.204)	
Firm fixed effects	Y	Y	Y	Y	Y	Y
Industry-time fixed effects	Y	Y	Y	Y	Y	Y
Country-time fixed effects	Y	Y	Y	Y	Y	Y
Number of observations	29119	28210	27644	24659	29119	27760
Adjusted R^2	0.356	0.349	0.370	0.350	0.356	0.358

Table 5: Country characteristics and COVID-19-induced CDS spread changes

This table reports regression results on the relation between country characteristics and the reaction of CDS spread changes to changes in COVID-19 infection rates, with controls for COVID-19 government policies and corporate characteristic/policies. The dependent variable is the weekly change in log CDS spreads for each firm. COVID19 is the weekly percentage change in COVID-19 infection rates in a country. All variables are defined in Appendix A. T-statistics are calculated from robust standard errors clustered by firm and are displayed in parentheses. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively.

Dep. = ΔCDS Spreads	(1)	(2)	(3)	(4)	(5)	(6)
COVID19	0.417***	0.383***	0.435***	0.432***	0.430***	0.448***
	(4.050)	(3.537)	(4.141)	(4.046)	(4.053)	(4.231)
GDP × COVID19	-0.014***	-0.013***	-0.015***	-0.015***	-0.015***	-0.015***
	(-4.047)	(-3.739)	(-4.212)	(-4.147)	(-4.155)	(-4.315)
GDP growth × COVID19	-0.012**	-0.012**	-0.013**	-0.013**	-0.013**	-0.012**
	(-2.049)	(-2.041)	(-2.044)	(-2.065)	(-2.020)	(-1.988)
Political stability × COVID19	-0.046***	-0.046***	-0.044***	-0.042***	-0.042***	-0.043***
	(-3.529)	(-3.872)	(-3.298)	(-3.166)	(-3.118)	(-3.190)
Foreign direct investment × COVID19	0.189**	0.151**	0.137	0.179**	0.187**	0.155*
	(2.207)	(1.987)	(1.615)	(2.098)	(2.193)	(1.817)
Debt to GDP × COVID19	0.004		-0.001	0.005	0.007	0.004
	(0.599)		(-0.164)	(0.801)	(0.956)	(0.547)
High debt to GDP × COVID19		-0.009				
		(-1.031)				
Low Distance to default × COVID19		-0.007				
		(-0.612)				
High debt to GDP × Low distance to default × COVID19		0.025**				
		(2.069)				
Income support policies			-0.010***			-0.008**
			(-2.825)			(-2.385)
Lockdown policies				-0.028**		
				(-2.570)		
Health and lockdown policies					-0.047***	-0.037**
					(-2.975)	(-2.451)
Corporate characteristics and policies × COVID19	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Industry-time fixed effects	Y	Y	Y	Y	Y	Y
Number of observations	28772	28772	28772	28772	28772	28772
Adjusted R^2	0.322	0.322	0.323	0.323	0.323	0.323

Table 6: Summary of impact of firm and country-level factors on pandemic-induced CDS spread changes

This table summarizes the impact of firm-specific and country-level characteristics on pandemic-induced CDS spread changes. For a country where the COVID-19 infections rate doubles in a week (100% increase), we calculate the difference in pandemic-induced weekly CDS spread changes between firms with the value of characteristics at the top quartile (Q_3) and those at the bottom quartile (Q_1) and report the statistical significance. For instance, the impact of 'Size' is given by $[\beta_{size} \times Q_3(\text{Size}) \times 100 - \beta_{size} \times Q_1(\text{Size}) \times 100]$, where β_{size} is the coefficient of 'Size×COVID19' estimated in Table 3 Column 4.

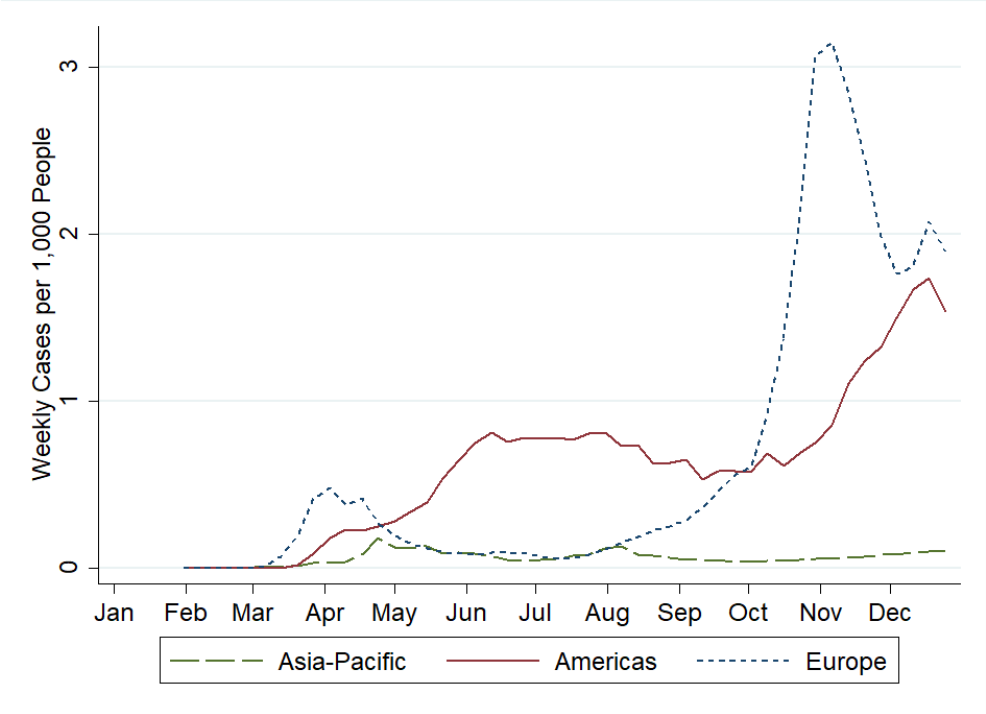
Firm-level variables (Coefficients from Table 3 Column 4/ $^{+}$Table 3 Column 5)	Q3 - Q1	Statistical Significance
Size	1.786	1%
Leverage	1.243	1%
Stakeholder engagement	-1.500	5%
Antitakeover provisions	1.200	10%
Distance to Default^{+}	-1.317	1%
Country-level variables (Coefficients from Table 5 Column 1)	**Q3 - Q1**	**Statistical Significance**
GDP	-2.376	1%
GDP growth (%)	-1.225	5%
Political stability	-3.790	1%
Foreign direct investment	0.359	10%

Table 7: Comparison of stock price and CDS spread changes in response to COVID-19

This table reports regression results on the lead-lag reaction of stock price changes and CDS spread changes in response to COVID-19. The dependent variables are the daily change in log CDS spreads for each firm in columns 1 to 3 and the daily stock returns for each firm in columns 4 to 6. Daily COVID19 is the daily percentage change in COVID-19 infection rates in a country. All variables are defined in Appendix A. T-statistics are calculated from robust standard errors clustered by firm and are displayed in parentheses. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively.

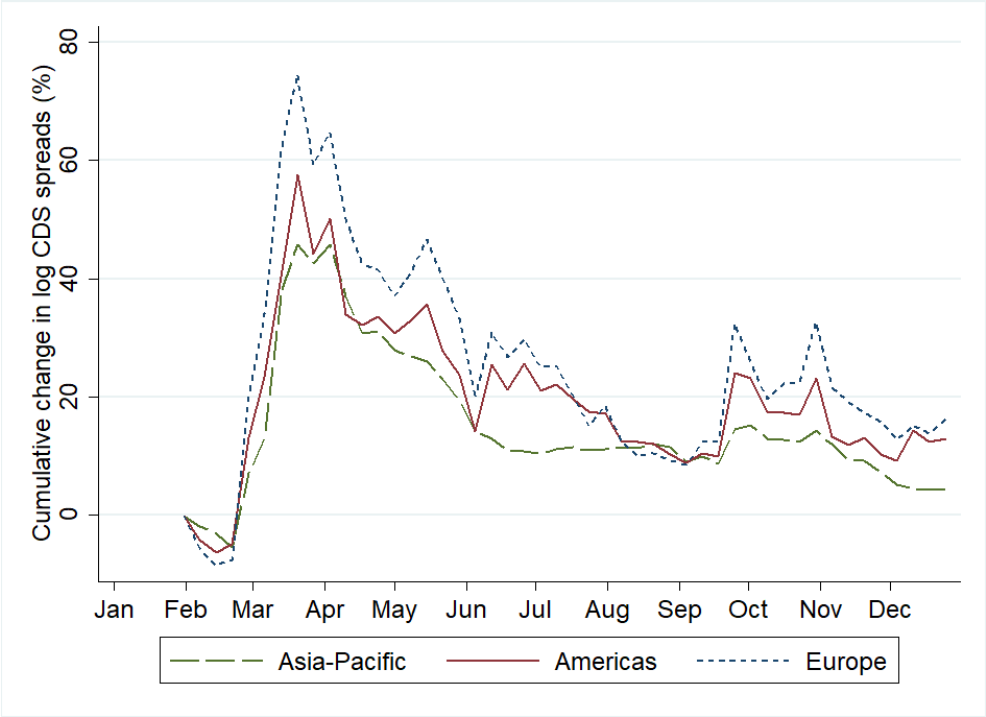
	(1)	(2)	(3)	(4)	(5)	(6)
	Dep. = ΔDaily CDS Spreads (%)			Dep. = Daily Stock returns (%)		
Daily stock returns in day *t-1 (%)*		-5.431***				
		(-4.947)				
Daily stock returns in week *t (%)*			-0.075***			
			(-5.350)			
ΔDaily CDS Spreads in day *t-1 (%)*					-0.613**	
					(-2.398)	
ΔDaily CDS Spreads in day *t (%)*						-0.022***
						(-5.262)
Size × Daily COVID19	1.225***	1.245***	1.233***	0.029	0.040	0.062
	(5.657)	(5.749)	(5.693)	(0.490)	(0.666)	(1.046)
Leverage × Daily COVID19	5.194***	5.232***	5.183***	-0.580	-0.493	-0.423
	(3.210)	(3.247)	(3.182)	(-1.436)	(-1.204)	(-1.032)
Stock volatility × Daily COVID19	69.177	67.310	68.807	-41.658***	-38.677**	-38.151**
	(1.446)	(1.401)	(1.437)	(-2.637)	(-2.365)	(-2.362)
Investment grade × Daily COVID19	-0.979*	-0.968*	-0.984*	0.103	0.101	0.077
	(-1.941)	(-1.918)	(-1.951)	(0.733)	(0.714)	(0.551)
Profitability × Daily COVID19	-5.365	-4.901	-5.225	4.742***	4.546***	4.442***
	(-1.023)	(-0.934)	(-0.997)	(3.498)	(3.355)	(3.303)
Cash holding × Daily COVID19	1.775	1.809	1.812	0.849	0.838	0.906
	(0.629)	(0.639)	(0.642)	(1.032)	(1.022)	(1.113)
Stakeholder engagement × Daily COVID19	-1.402**	-1.372**	-1.423**	0.103	0.062	0.031
	(-2.426)	(-2.373)	(-2.458)	(0.608)	(0.365)	(0.180)
Antitakeover provisions × Daily COVID19	0.216	0.214	0.211	-0.047	-0.050	-0.046
	(1.580)	(1.556)	(1.542)	(-1.268)	(-1.331)	(-1.223)
Employee health policy × Daily COVID19	-0.554	-0.593	-0.530	-0.046	-0.035	-0.044
	(-0.496)	(-0.531)	(-0.473)	(-0.194)	(-0.147)	(-0.185)
Firm fixed effects	Y	Y	Y	Y	Y	Y
Industry-time fixed effects	Y	Y	Y	Y	Y	Y
Country-time fixed effects	Y	Y	Y	Y	Y	Y
Number of observations	149437	147346	147356	147926	147319	147356
Adjusted R^2	0.249	0.252	0.253	0.516	0.523	0.524

Figure 1: COVID-19 Infection Rates



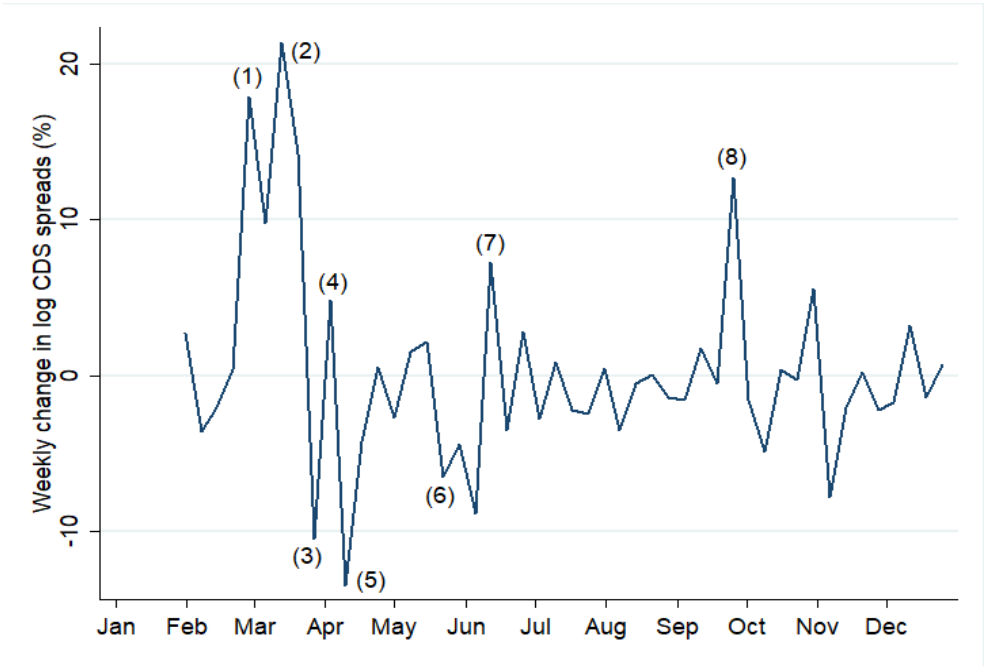
This figure shows the weekly COVID-19 infection rates in 2020, measured as the number of infections per 1000 people, for Asia-Pacific, Americas, and Europe, respectively.

Figure 2: Cumulative Change in Log CDS Spreads



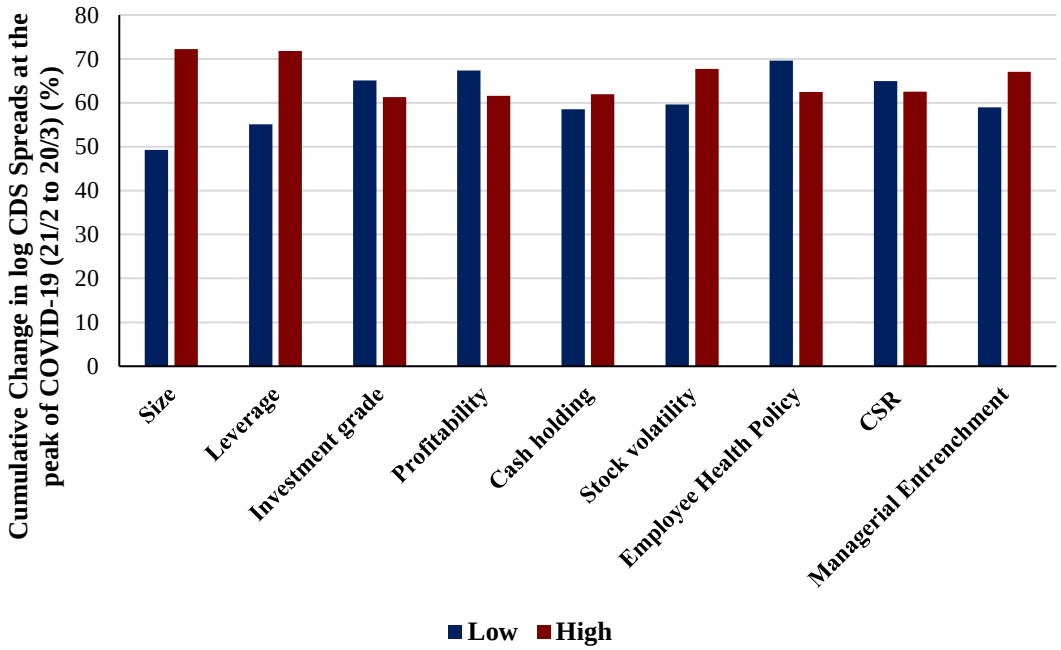
This figure shows the cumulative change in log CDS spreads in 2020 for our sample firms located in Asia-Pacific, Americas, and Europe, respectively.

Figure 3: Weekly Change in Log CDS Spreads



This figure shows the average weekly change in log CDS spreads for our sample firms in 2020. Some major events related to significant changes in CDS spreads are enumerated: 1) the week ending February 28, 2020 (increase of 17.9%) when cases in Italy started spiking and the Dow Jones Industrial Average experienced the worst day in two years (on February, 24); 2) the week ending March 13, 2020 (increase of 21.4%) when the WHO declared COVID-19 a pandemic (on March, 11); 3) the week ending March 27, 2020 (drop of 10.5%) when the Dow Jones Industrial Average surged by more than 2,000 points after news that in the U.S. a $2 trillion stimulus bill was close to approval (on March, 24) and when President Trump signed the stimulus bill after the legislation was passed in a bipartisan vote by US Congress (on March, 27); 4) the week ending April 3, 2020 (increase of 4.8%) as further bad news arrive, including the positivity to COVID-19 of the UK Prime Minister Boris Johnson; 5) the week ending April 10, 2020 (drop of 13.4%) when the second COVID-19 vaccine trial began in the U.S.; 6) the week ending May 22, 2020 (drop of 6.5%) when the U.S. and AstraZeneca announced a collaboration to speed up the development of a vaccine; 7) the week ending June 12, 2020 (increase of 7.2%) when the total number of confirmed cases hits 2 million in the U.S.; and 8) the week ending September 25, 2020 (increase of 12.7%) when the UK upgraded the COVID-19 alert level from 3 to 4 (on September, 21) with over 4,000 daily confirmed cases (start of a 'second wave').

Figure 4: Corporate characteristics and COVID-19-induced CDS spread changes



This figure plots the cumulative change in log CDS spreads at the peak of COVID-19 (the 4 weeks from 21st of February to 20th of March 2020). Firms are divided into terciles within each country according to different firm characteristics and a firm is classified as "high" ("low") if the firm ranks in the top (bottom) tercile. Firms with (without) an investment grade credit rating, employee health policy and stakeholder engagement policy are classified as "high" ("low"), respectively. CSR performance is proxied by the existence of some stockholder engagement policy and managerial entrenchment is proxied by the number of antitakeover provisions.

Appendix: Variable Definitions

This table provides definitions and data sources for all the variables used in this study.

Variable name	Variable definition	Source
Δ*CDS Spreads*	Weekly change in log CDS spreads for each firm, calculated as log(CDS in week *t*) – log(CDS in week *t-1*).	Markit
COVID19	Weekly percentage change in COVID-19 infection rates in a country. Infection rate is measured as the number of COVID-19 infections per million people. For economy c in week t, *COVID19* = log (Infection rate in week *t*) – log (Infection rate in week *t-1*).	Our World in Data
Size	Natural logarithm of total assets (AT) in US dollars.	Compustat Global
Leverage	Book value of debt (DLTT+DLC) scaled by the book value of total assets (AT).	Compustat Global
Investment grade	Indicator variable that equals 1 if a firm has an investment grade credit rating, and 0 otherwise.	Capital IQ
Profitability	Operating income before depreciation (OIBDP) scaled by the book value of total assets (AT).	Compustat Global
Cash Holding	Cash holding (CHE) scaled by the book value of total assets (AT).	Compustat Global
Stock volatility	Standard deviation of daily stock returns over the year.	Compustat Global
Stock return	Weekly stock return for each firm, calculated as log(Stock price in week *t*) – log(Stock price in week *t-1*).	Compustat Global
Debt rollover risk	Long term debt due in one year (DD1) divided by cash holding (CHE).	Compustat Global
Distance to default	Natural logarithm of one plus (naïve) distance to default calculated following Bharath and Shumway (2008) – Eq. (12) page 1347.	Compustat Global
Stakeholder engagement	Indicator variable that equals 1 if a firm explains how it engages with its stakeholders and how it involves the stakeholders in its decision-making process, and 0 otherwise.	Refinitiv Eikon
CSR reporting	Indicator variable that equals 1 if a firm publishes a separate CSR report or publishes a section in its annual report on its CSR activities, and 0 otherwise.	Refinitiv Eikon
CSR strategy score	CSR strategy score reflects a firm's practices to communicate that it integrates the economic, social and environmental dimensions into its day-to-day decision-making processes. The score ranges from 0 to 100. We divide the score by 100.	Refinitiv Eikon
Independent directors	Percentage of independent directors in the firm.	Refinitiv Eikon
Antitakeover provisions	Number of antitakeover provisions in place for the firm.	Refinitiv Eikon
Employee health policy	Indicator variable that equals 1 if a firm has a policy to improve employee health and safety, and 0 otherwise.	Refinitiv Eikon
Employee health training	Indicator variable that equals 1 if a firm trains its employees on health and safety, and 0 otherwise.	Refinitiv Eikon
Supply chain health policy	Indicator variable that equals 1 if a firm has a policy to improve employee health and safety in its supply chain, and 0 otherwise.	Refinitiv Eikon
Industry exposure to COVID-19	Measure of industry's exposure to COVID19 using data on task description of occupations within industries and data on the geographic location of businesses within industries. We take logs of the score as the score is right skewed.	Koren and Peto (2020)
GDP	Natural logarithm of a country's Gross Domestic Product (GDP).	World Development Indicators
GDP growth	A country's GDP growth.	

		World Development Indicators
Debt to GDP	A country's government debt to GDP ratio	World Development Indicators
Foreign direct investment	A country's foreign direct investment inflow as a proportion of its GDP.	World Development Indicators
Political Stability	Perception of the likelihood of political instability and/or politically motivated violence for a country.	World Governance Indicators
Income Support	Indicator variable that equals 0 for governments that do not provide income support, equals 1 for governments that are replacing less than 50% of lost salary, and equals 2 for governments that are replacing 50% or more of lost salary.	Our World in Data
Lockdown Policies	A composite measure based on nine indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100. We divide the score by 100.	Our World in Data
Health and Lockdown Policies	A composite measure based on thirteen indicators including school closures, workplace closures, travel bans, testing policy, contact tracing, face coverings and vaccine policy, rescaled to a value from 0 to 100. We divide the score by 100.	Our World in Data

Online Supplement

Table S1: Dataset creation and data merge steps

1) We sample information on CDS spreads from Markit for 2,297 firms domiciled in 100 different countries.
2) We obtain COVID-19 infections data from the website 'Our World in Data' for 98 countries, which brings our sample of firms to 2,274. The countries which are dropped are Jersey and Guernsey.
3) We obtain complete corporate financial data from Compustat and Compustat Global. We find data available for all needed variables for 775 firms out of the 2,274 in our sample. The 775 firms are domiciled in 33 different countries.
4) Out of this sample, we obtain corporate rating data from Capital IQ (to define the Investment Grade dummy) for 707 firms which are domiciled in 31 different countries.
5) Finally, we obtain firms' institutional features from Refinitiv Eikon for 655 firms out of the 707 in our generated sample. These 655 firms are domiciled in 27 different countries.

Table S2: Sample description

This table provides the breakdown of our global firm sample by country (Panel A) and sector (Panel B).

Panel A		
Country	Number of firms	Percentage
Australia	9	1.37
Austria	2	0.31
Belgium	5	0.76
Brazil	5	0.76
Canada	21	3.21
Chile	2	0.31
Finland	3	0.46
France	24	3.66
Germany	24	3.66
Greece	2	0.31
India	9	1.37
Italy	7	1.07
Japan	145	22.14
Korea	15	2.29
Malaysia	3	0.46
Mexico	2	0.31
Netherlands	8	1.22
Norway	3	0.46
Philippines	3	0.46
Singapore	3	0.46
South Africa	2	0.31
Spain	10	1.53
Sweden	5	0.76
Switzerland	5	0.76
Taiwan Province of China	3	0.46
United Kingdom	26	3.97
United States	309	47.18
Total	655	100
Panel B		
Sector	Number of firms	Percentage
Energy	38	5.8
Materials	70	10.69
Industrials	141	21.53
Consumer Discretionary	102	15.57
Consumer Staples	56	8.55
Healthcare	44	6.72
Financials	40	6.11
Information Technology	52	7.94
Communication Services	54	8.24
Utilities	50	7.63
Real Estate	8	1.22
Total	655	100

Table S3: Corporate policies, industry exposure and COVID-19-induced CDS spread changes (Additional proxies)

This table reports regression results on the relation between corporate policies and the reaction of CDS spreads to changes in COVID-19 infection rates. Additional corporate proxies include CRS reporting and strategy score, % independent directors, employee health training, supply chain health policy, top quartile, and top five exposed industries. The dependent variable is the weekly change in log CDS spreads for each firm. COVID19 is the weekly percentage change in COVID-19 infection rates in a country. All variables are defined in Appendix A. T-statistics are calculated from robust standard errors clustered by firm and are displayed in parentheses. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively.

Dep. = ΔCDS Spreads	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CSR reporting × COVID19	-0.028***						
	(-3.590)						
CSR strategy score × COVID19		-0.034***					
		(-3.647)					
Independent directors × COVID19			-0.026				
			(-1.458)				
Employee health training × COVID19				-0.015*			
				(-1.926)			
Supply Chain health policy × COVID19					-0.010*		
					(-1.920)		
Top quartile exposed industries × COVID19						0.027***	
						(2.776)	
Top five exposed industries × COVID19							0.031**
							(2.181)
Size × COVID19	0.011***	0.012***	0.009***	0.009***	0.010***	0.011***	0.010***
	(4.764)	(4.827)	(3.511)	(3.690)	(3.815)	(4.477)	(4.422)
Leverage × COVID19	0.049***	0.050***	0.054***	0.051***	0.052***	0.054***	0.057***
	(3.174)	(3.163)	(3.346)	(3.185)	(3.238)	(3.261)	(3.483)
Stock volatility × COVID19	0.322	0.263	0.284	0.303	0.324	0.312	0.344
	(0.760)	(0.642)	(0.674)	(0.710)	(0.759)	(0.718)	(0.806)
Investment grade × COVID19	-0.008	-0.008	-0.010*	-0.009*	-0.009*	-0.006	-0.007
	(-1.493)	(-1.491)	(-1.737)	(-1.655)	(-1.670)	(-1.154)	(-1.283)
Profitability × COVID19	-0.066	-0.061	-0.083	-0.081	-0.072	-0.124**	-0.113**
	(-1.186)	(-1.102)	(-1.492)	(-1.460)	(-1.279)	(-2.271)	(-2.084)
Cash holding × COVID19	0.018	0.019	0.013	0.010	0.016	0.025	0.022
	(0.652)	(0.699)	(0.463)	(0.371)	(0.589)	(0.845)	(0.754)
Firm fixed effects	Y	Y	Y	Y	Y	Y	Y
Industry-time fixed effects	Y	Y	Y	Y	Y	Y	Y
Country-time fixed effects	Y	Y	Y	Y	Y	Y	Y
Number of observations	29119	29119	29119	29119	29119	27760	27760
Adjusted R^2	0.356	0.356	0.355	0.355	0.355	0.358	0.357

Table S4: Endogeneity Checks –Implementation of COVID-19 support policies and COVID-19 infections growth

Panel A: Regression including only observations before the week ending 13th of March 2020

This table reports regression results on the relation between all corporate characteristics and policies and the reaction of CDS spread changes to changes in COVID-19 infection rates using only observations before the week ending 13th of March 2020. The dependent variable is the weekly change in log CDS spreads for each firm. COVID19 is the weekly percentage change in COVID-19 infection rates in a country. All variables are defined in Appendix A. T-statistics are calculated from robust standard errors clustered by firm and are displayed in parentheses. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively.

Dep. = ΔCDS Spreads	
Size* COVID19	0.008***
	(2.793)
Distance to default * COVID19	-0.001
	(-0.414)
Profitability * COVID19	-0.115*
	(-1.864)
Cash holding * COVID19	0.041
	(1.429)
Stakeholder engagement * COVID19	-0.018**
	(-2.340)
Antitakeover provisions * COVID19	0.002
	(1.322)
Employee health policy * COVID19	-0.006
	(-0.480)
Industry exposure to COVID-19 * COVID19	0.016***
	(2.672)
Firm fixed effects	Y
Industry-time fixed effects	Y
Country-time fixed effects	Y
Number of observations	3774
Adjusted R^2	0.474

Panel B. Speed of COVID-19 policy implementation

This table reports regression results on the relation between a country's level and growth of GDP and Debt-to-GDP, and the speed of COVID-19 policies' implementation. The dependent variable is the number of days between the first confirmed COVID-19 case in the country and the implementation of the respective COVID-19 policy. All other variables are defined in Appendix A. T-statistics are displayed in parentheses. Statistical significance at the 10, 5, and 1% level is indicated by *, **, and ***, respectively.

	(1)	(2)	(3)
	School closure	Workplace closure	Income support
GDP	1.580	5.101	7.645
	(0.474)	(1.629)	(0.952)
GDP growth	2.931	3.711	-2.642
	(1.124)	(1.515)	(-0.420)
Debt to GDP	4.911	0.347	-5.260
	(0.643)	(0.048)	(-0.286)
Number of observations	25	25	25