CSR and Firm Survival: Evidence from the Climate and Pandemic Crises

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Abstract

We analyse the relationship between the extent of a firm's corporate social responsibility (CSR) and its long-term survival probability. We conjecture that a better CSR rating is associated with a lower probability of corporate failure and a longer survival period. Consistent with this, we document that four CSR dimensions (environment, community, employee relations, and product) out of six are positively related to firms' survival probability. The positive association between CSR ratings and firm survival is stronger for firms operating in more competitive industries and those with weaker governance. We find that a firm's engagement in CSR activities is particularly crucial for firm survival during pandemics and under adverse climate conditions. We establish causality in the relation between a firm's CSR activities and its survival probability using instrumental variable (IV) and Heckman two-step analyses. Finally, we find that better financial performance, less stringent financial constraints, greater managerial discipline, and enhanced labor productivity are some of the channels through which firms engaging in more CSR activity achieve longer survival times.

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Abstract

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JEL Classification: G30; G41; M14;

Keywords: Corporate Social Responsibility; Climate Change; Pandemic Uncertainty; Firm Survival; Corporate Governance

1. Introduction

Over the past decade, corporate social responsibility (CSR) has come to the forefront of attention both among firms and in the academic literature (Campbell, 2007; Cheng et al., 2014; Christensen et al., 2017; Davidson et al., 2019; Martin, 2021; Riedl and Smeets, 2017). According to the *Global Sustainable Investment Review 2018*, global CSR investment has reached $30 trillion – up 68% since 2014 and tenfold since 2004.[1] Managers invest in CSR activities either voluntarily as part of their firm's strategy or due to increasing societal pressure on firms to behave in socially responsible ways.

Since 2008, researchers have identified 335 human diseases as having emerged in the period between 1960 and 2004, and their names now run the gamut from A to Z, from Avian flu to Zika (Snowden, 2019). Furthermore, since 2003 the world has faced a series of medical challenges, such as the outbreaks of SARS, MERS and Ebola, that have required immediate global action and coherent global responses. The effects of the ongoing coronavirus (COVID-19) pandemic on every aspect of social and economic life have highlighted the importance of CSR not only for corporate survival but also for human longevity; COVID-19 has unleashed a series of responses that have changed the way firms will operate hereafter. The pandemic is still too new for us to be able to assess its final consequences. Nevertheless, the virus's impact on communities has been substantial and several of its characteristics are closely related to the scope of this study, the origins of which pre-date the pandemic. Why has the pandemic afflicted society in such a significant way? Pandemics penetrate societies because of specific weaknesses in the relationships between people, the environment, and other species. In other words, COVID-19 has spread in the way it has as a result of the society we have created. At this point, it is worth mentioning that of all the issues raised by COVID-19, the most crucial is that of the preparedness or otherwise of governments, firms and people in confronting the virus that ignited the pandemic.

Although each of the outbreaks referred to above was accompanied by a frenetic reaction at all levels, it was followed by a societal amnesia (so-called "business as usual"). Previous literature provides inconsistent evidence as to the impact of CSR on corporate financial performance and shareholder value, especially in the era of "chronic emergency" (as described by virologist Brian Bird) in which we now live (Bardos et al., 2020; Chen et al., 2018; Christensen et al., 2017; Fernando et al., 2017; Lys et al., 2015; Manchiraju and Rajgopal, 2017). In addition, little evidence exists as to whether greater CSR leads to lower risk of corporate failure or higher likelihood of delisting during crises periods such as pandemics and

[1] See the report by the Global Sustainable Investment Alliance: http://www.gsi-alliance.org/.

climate change. We aim to address this gap in the literature by investigating the association between CSR and economic objectives from the perspective of corporate survival.

There are at least two opposing theoretical lenses through which one may view firms' CSR activities. The first is the traditional view endorsed by Milton Friedman (1970) and many others, which argues that the objective of U.S. corporations should be mainly to maximize profits; improving social welfare was not the concern of such corporations. The second is the view that a firm is "a nexus of contracts" between shareholders and other stakeholders. In this latter spirit, several theoretical papers, starting with Coase (1937) and advancing through Alchian and Demsetz (1972), Jensen and Meckling (1976), Cornell and Shapiro (1987), and Krueger (2015), have argued that CSR activities have a positive effect on shareholder wealth because placing a focus on the interests of other stakeholders increases the latter's willingness to support these firms' operations, improving their longevity (survival). In other words, the above studies view the firm as a nexus of contracts between shareholders and other stakeholders, in which each group of stakeholders supplies the firm with critical resources or effort in exchange for claims that are either outlined in explicit contracts (e.g., wage contracts and product warranties) or suggested in implicit contracts (e.g., promises of job security to employees and continued service to customers): see, for example, Deng et al. (2013). Because firms that invest more in CSR activities (high-CSR firms) tend to develop stronger reputations for maintaining their commitments when it comes to contracts. Therefore, stakeholders of such firms will have stronger incentives to contribute resources and effort to them and to accept less favorable contracts than stakeholders of low-CSR firms. Thus, nexus of contracts theory suggests that the interests of shareholders and other stakeholders in high-CSR firms are in greater alignment than they are in low-CSR firms. Hence, under this view, CSR activities are more likely to contribute to long-term corporate profitability and efficiency (Freeman et al., 2004; Jensen, 2002). We develop our tesable hypotheses based on the nexus of contracts view of the firm.

Recently, light has fallen upon U.S. Securities and Exchange Commission (SEC) rules regarding the use by investors of CSR activities as a basis to select firms. The Labor Department in the U.S. suggested a ban on environmental, social and governance (ESG) investing: for example, using CSR as one of the criteria for investment in firms by financial advisers. The proposed ban was opposed by 95% of asset managers and market participants, indicating widespread support for the use of CSR activities in firms as a criterion for investment. Thus, in supporting CSR activities, leading investment manager BlackRock suggested that ESG data could be incorporated across asset classes in both active and index investment strategies to give a clearer picture of the financial risks and opportunities inherent in a portfolio.

Our choice of survival as an output proxy for corporate success is appropriate. Corporate survival depends on the work of creative individuals and leaders with exceptional knowledge and skills. At the same time, it is also likely that involvement in CSR activities is highly appreciated and the specialized human capital conducting social support activities can be regarded as an asset with low redeployment ability. The comparative efficiency of CSR activities is important because it addresses both the social impact of the actions of non-profits, corporate interventions or other forms of collective action as well as their strategic sustainability. Their intensity, inspired by global natural phenomena that deliver shocks to the planet, such as the effects of climate change and pandemic disease, motivates us to explore whether particular firms are better able to achieve prosperity and survivability under such unprecedented conditions.

It is likely that the risk of CEO dismissal when corporate performance is disappointing varies between firms with high levels of CSR and those with low levels. Because firms with better social performance are at a potential disadvantage as a result of the expenditure associated with CSR, investors may be more sensitive to financial outcomes in an effort to ensure that such firms will not lose out to competitors as a consequence of this CSR investment. It is also possible that CSR itself disciplines CEO efforts to avoid self-interested pursuits that may compromise corporate performance. In this way, CSR is likely to play an important role in complementing corporate governance and mitigating managerial entrenchment. Thus, an important channel through which high-CSR firms might achieve better survival rates could be by retaining high-quality, well-performing CEOs, while dismissing those of low quality and/or who perform poorly.

The lack of CSR-related evidence in the context of corporate longevity raises several interesting questions. Is it worth avoiding CSR to avoid "unnecessary" costs or does it pay to get involved in socially responsible activities? If CSR does "pay", how should companies react at times of natural disaster, of global health threats such as a pandemic, and in response to the effects of climate change? Do CSR activities bring higher levels of corporate risk? What happens if a firm is involved in high levels of CSR activity, but its CEO fails to deliver satisfactory outcomes? Finally, what are the channels through which greater longevity is conferred on high-CSR firms?

To shed light on this subject, we analyze the relationship between CSR activities and corporate survival using a panel sample of 2,622 publicly listed U.S. firms. CSR performance ratings were obtained from the Kinder, Lydenberg and Domini (KLD) Research & Analytics database, which is now part of Morgan Stanley Capital International (MSCI). To facilitate our analysis, we obtain biographical data on the CEOs of firms from the BoardEx database, data on the number of positive influenza tests reported to the

Centers for Disease Control and Prevention (CDC) by Public Health Laboratories, and various climate change indicators, as well as details of state divorce rates from the United States Census Bureau.

Our empirical results may be summarized as follows: first, we find that firms with high levels of CSR tend to have a lower delisting risk and a longer survival period, suggesting that involvement in CSR signals that a company is more oriented to the long term, with a CSR strategy also helping to mitigate agency problems between managers and shareholders. The effect is both statistically and economically significant: high-CSR firms are 6.5% less likely to delist than low-CSR ones, and for each one-unit improvement in net CSR score, the failure risk reduces by 2%. We further investigate how the six individual dimensions of CSR affect corporate survival. The empirical evidence suggests that, in addition to product-related dimensions, environment, community, and employee relations are all key, economically significant factors that increase a firm's survival rate and improve corporate performance. In addition, we find that high-CSR firms have better access to finance, indicating one mechanism by which CSR may enhance a firm's survivability.

Second, we show that high-CSR firms are more likely to survive pandemics and resist risks associated with climate change. In particular, in highly infected regions and during the peak years of a pandemic, high-CSR firms demonstrate substantially higher survival rates than others. Furthermore, infection rates are significantly lower in regions where higher levels of CSR are in evidence, suggesting bidirectional effects between CSR and a pandemic. Similarly, we use state-level CO_2 emissions and temperature deviation from the mean as proxies for climate change risk and find that, in states with reduced levels of CO_2 emissions and greater temperature departures from the mean, high-CSR firms outperform their low-CSR counterparts in terms of both financial performance and long-term survival.

Third, our results address potential issues of endogeneity. Thus, firms may choose to invest in CSR activities as a result of particular corporate characteristics, which raises concerns about selection bias. To address this, we employ an instrumental variable (IV) analysis, and instrument for CSR activities using the state divorce rate, the Palmer Drought Severity Index (PDSI), and the regional infection rate. We also overcome a further challenge related to endogeneity by using a Heckman (1979) two-step model; our results remain unchanged after controlling for the inverse Mills ratio (IMR), indicating that our findings are not driven by unobservable omitted variables.

To corroborate the inference from our main analysis, we conduct several cross-sectional tests. First, we examine whether the effect of CSR on corporate survival varies with industry competition. Using the Herfindahl–Hirschman index (HHI) as a measure of product market competition, we find that the impact

of CSR is stronger in more competitive industries. This suggests that CSR generates competitive advantage that help firms to outperform their rivals. Second, we find that the negative association between CSR activities and corporate failure is more pronounced when a firm's internal and external monitoring mechanisms are weak, as proxied for by a higher entrenchment index (E-index; Bebchuk et al., 2009) and lower institutional ownership. Third, we report an attenuation of the CSR effect for younger and smaller firms, suggesting that such firms are largely immune to the detrimental impacts of low CSR activity.

Our study contributes to several strands of the literature, building first of all on recent work on CSR (Cronqvist and Yu, 2017; Dai et al., 2020; Davidson et al., 2019; Dyck et al., 2019; Hegde and Mishra, 2019; Kim et al., 2012; Liang and Renneboog, 2017; Moser and Martin, 2012; Nofsinger et al., 2019). Previous research has examined the impact of CSR on various firm-level characteristics, such as value (Buchanan et al., 2018; Ferrell et al., 2016; Gao and Zhang, 2015), financial performance (Khan et al., 2016), M&A activity (Arouri et al., 2019; Bereskin et al., 2018; Deng et al., 2013), cost of capital (Dhaliwal et al., 2011), corporate cash holdings (Cheung, 2016), brand concepts (Torelli et al., 2012), and reputation (Brammer and Pavelin, 2006). In terms of stakeholder perception of CSR, prior studies have investigated stakeholder engagement (Jensen, 2002), investor sentiment (Naughton et al., 2019), investor reaction (Hartzmark and Sussman, 2019; Hong and Kacperczyk, 2009; Martin and Moser, 2016), analyst forecasting error (Dhaliwal et al., 2012), and employee satisfaction (Edmans, 2011). However, empirical evidence in relation to the association between CSR, climate change, pandemics and long-term firm survivability is scarce. To the best of our knowledge, this is the first study to directly investigate the influence of corporate social performance on firms' survival profiles.

The second literature strand to which we contribute is that which analyzes factors affecting firm survival [e.g., capital structure policy (Chung et al., 2013), leverage level (Zingales, 1998), specialist CEOs (Gounopoulos and Pham, 2018), institutional quality (Baumohl et al., 2019)]. Because most research in this realm focuses on financial and managerial variables, we diverge from the mainstream by investigating the potential impact of CSR. We provide new evidence to suggest that CSR strategy benefits both stakeholders and shareholders by enhancing a firm's survival capacity. Furthermore, we add to this literature strand by analyzing how each of the six CSR dimensions affects firm survival rates. Specifically, we find that not all CSR dimensions have equal influence on firm survivability and, thus, we highlight the importance of examining the various dimensions of CSR separately rather than only focusing on the concept as a whole.

The third literature strand concerns how climate change interacts with CSR activities to affect firm survival. For instance, Choi et al. (2020) investigated how abnormal temperatures affect investors' attention

to climate change and the impact of this on the financial market, finding that unusually warm weather heightens public awareness and leads to lower stock returns for carbon-intensive firms. Krueger et al. (2020) conducted a survey of institutional investors and showed that regulation-related climate risks have vital financial implications when it comes to investment decisions. We contribute to this literature strand by showing that although climate change is negatively associated with both firm survivability and financial performance, the effect is substantially weaker in the case of firms with high CSR activity. Moreover, we provide new evidence that firms with better social performance are more likely to survive crises during a pandemic period.

The rest of the paper is organized as follows: Section 2 discusses the underlying theories and develops testable hypotheses; Section 3 describes the data formation procedure, explains our methodology, and reports our data and sample selection procedures. Section 4 presents our empirical tests and results, and Section 5 presents our results in relation to endogeneity. Section 6 reports the cross-sectional analyses, while Section 7 presents our empirical tests on the channels through which CSR might affect corporate performance. The robustness of our results is evaluated in Section 8, and we draw our conclusions in Section 9.

2. Theory and Hypotheses Development

Previous studies have conducted wide investigation of the implications of CSR activities on corporate performance. Although the evidence is mixed, the vast majority conclude that high levels of CSR induce better financial performance and increase shareholder value (Deng et al., 2013; Lev et al., 2010; Lins et al., 2017; Servaes and Tamayo, 2013). Such positive association is in line with the theory of the firm as a nexus of contracts, as developed by Coase (1937) and advanced by Jensen and Meckling (1976) and Hill and Jones (1992). Under this theory, a firm consists of a set of interrelated contracts between shareholders and various stakeholders, either explicit (e.g., employment contracts) or implicit (e.g., promises of expected working conditions and job security). While defaulting on explicit commitments would result in legal sanctions and bankruptcy, the payoffs on implicit claims are less certain because of their ambiguous nature. Firms that engage in CSR activities may be able to build stronger reputations (Brammer and Pavelin, 2006) and encourage stakeholder trust in their ability to honor implicit commitments, thereby giving stakeholders more incentive to dedicate effort and resource to high-CSR firms than low-CSR ones.

Further, Edmans (2011) investigated the 100 best U.S. companies to work for and documented a

positive relationship between employee satisfaction as a socially responsible investment screen and long-term stock returns. In the same vein, Balakrishnan et al. (2011) state that corporate giving motivates employee effort and induces employee contributions even if they would not be remunerated for their actions. Enhanced stakeholder engagement contributes to superior CSR performance, inhibiting short-term opportunistic behavior by managers and reducing agency costs (Cheng et al., 2014). It is also argued that the social capital created by CSR activities can reduce idiosyncratic risk (Cheung, 2016) and provide firms with competitive advantages in the long run (Eccles et al., 2014)

Recent research has also provided evidence that firms with high levels of CSR may gain benefits in the external capital market. For example, Dhaliwal et al. (2011) suggested that firms' voluntary CSR disclosures are positively associated with subsequent reductions in the cost of equity capital, and high-CSR firms tend to raise more capital when conducting seasoned equity offerings. Consistent with this, Cheng et al. (2014) examined CSR in relation to corporate financial constraints and found that CSR strategies lead to better access to finance through mitigation of information asymmetry. Focusing on the impact of CSR on firms' M&A activities, Arouri et al. (2019) reported that deals conducted by high-CSR firms have narrower arbitrage spreads and thus lower levels of uncertainty associated with them. Furthermore, firms with high CSR ratings are more likely to receive optimistic recommendations from analysts, making them more attractive to investors (Ioannou and Serafeim, 2015). On the basis of the above, we expect that long-time CSR-oriented firms that benefit from better stakeholder engagement and increased transparency may outperform their counterparts in terms of survival. We therefore hypothesize a positive relationship between CSR activity levels and firm survival:

H1: Firms with high CSR are less likely to experience delisting and will survive longer.

The COVID-19 outbreak has brought about unprecedented challenges to both society and the economy, causing immense disruptions to countless corporations. During the pandemic period, firms' priorities have switched from pursuing financial outcomes to mitigating operational disruptions and surviving the crisis. A recent China-based survey carried out by McKinsey sheds light on the important role that CSR plays in motivating people and keeping a company afloat during a pandemic.[2] According to the survey, a majority (75%) of employees have engaged in or are aware of CSR activities in the fight against COVID-19, such as providing volunteer services or offering donations. Having thus understood the

[2] The survey is available at: https://www.mckinsey.com/featured-insights/asia-pacific/re-energizing-through-the-epidemic-stories-from-china#.

contribution that their company makes to society, employees may derive an additional sense of meaning from their work, which generates spiritual energy, which matters to firm survivability.

Aside from supporting the community, CSR also provides a reflection of how firms treat their workers; for example, in terms of granting extra pay and providing essential protective equipment in the workplace. By participating in CSR activities, a firm can highlight its value to the public, build its reputation, and promote customer and employee loyalty, which in turn enhances corporate financial performance and long-term survival. *Morningstar* provides evidence that high-CSR stocks lost less money than non-CSR ones during market declines and displayed less volatility; similarly, *Barron's* also finds that the most sustainable companies outperform the market.[3] Therefore, high-CSR firms are expected to suffer less during the pandemic and survive longer in the post-pandemic period, which leads to our second hypothesis:

H2: Firms that engage in CSR-related activities during the pandemic will perform better and survive longer in the post-crisis period.

In recent decades, the world has been confronted by several climate-related hazards. The increasing frequency of natural disasters, such as severe heatwaves, droughts, wildfires, storms and floods, have raised wide public concern about climate change and the role of companies in fending off such a global crisis. The *Economist* reports that 67% of S&P 500 companies are now disclosing their emissions, compared to only 53% five years ago.[4] The urgency of addressing climate change has shaken market confidence in less-"green" corporations. For example, Choi et al. (2020) report that firms with high carbon emissions earn lower stock returns when abnormally warm weather is experienced and prompts more attention on climate change. This is consistent with the findings of Heinkel et al. (2001), which link the lower stock prices of polluting firms with fewer green investors and a resistance to risk-sharing among non-green investors.

Moreover, environmentally damaging behavior may invite additional regulatory scrutiny and greater external pressure. According to a survey conducted by Krueger et al. (2020), institutional investors have deep concerns about the risks to their portfolios of climate-related regulation, which they believe have already started to materialize. Therefore, we predict that firms that engage in higher levels of CSR activity and are located in states with higher public awareness of climate change will achieve better financial performance and are more likely to survive. This leads to our third hypothesis:

[3] The Morningstar article is available at: https://www.morningstar.in/posts/58587/esg-stocks-outperform-wider-market.aspx; the Barron's article is available at: https://www.barrons.com/articles/the-100-most-sustainable-companies-51581095228.
[4] See: https://www.economist.com/leaders/2020/06/18/green-investing-has-shortcomings.

H3: When subject to substantial temperature variation, firms with higher levels of CSR activity tend to have better financial performance and to survive longer.

Operating in highly concentrated industries requires firms to build competitive advantage to differentiate themselves from their rivals. Better CSR performance may generate firm-specific resources such as reputation, employee loyalty and customer satisfaction. For instance, Sharma and Vredenburg (1998) report that proactive environmental strategies are linked to organizational capabilities and competitive strength. Meanwhile, Sen and Bhattacharya (2001) and Simmons and Becker-Olsen (2006), propose a marketing function for socially responsible investments. These unique and intangible assets can be of high value and difficult for competitors to imitate, illustrating the potential of CSR activities to foster competitive advantage (Barney, 1991). Therefore, firms in industries that are subject to greater competition are more likely to benefit from CSR strategies than those operating in less competitive ones, where the switching costs for customers and employees are higher. This leads to our fourth hypothesis:

H4: Ceteris paribus, *the positive association between CSR and firm survival will be more pronounced in competitive industries.*

The separation of management and ownership in modern corporations gives rise to the problem of agency, which argues that managers engage in various activities to pursue their own self-interest at the cost of shareholder wealth (Jensen and Meckling, 1976). High-quality corporate governance may help alleviate this problem by constraining managers' incentives to invest in value-destroying projects (Shleifer and Vishny, 1997). For example, equity-incentive contracts involving share ownership and stock options may serve to better align the interests of managers with those of investors. In addition, institutional shareholders, acting as external monitors, may play an important role in disciplining managerial behavior (Chen et al., 2012). By promoting CSR activities, managers may signal their concerns for the long-term welfare of their firms by building stakeholder relationships (Bitektine, 2011; Hambrick and Mason, 1984). This helps to persuade investors that managers are less likely to take advantage of shareholders for personal benefit. Thus, CSR strategies may be regarded as evidence of managerial self-discipline and a focus on maximizing shareholder wealth. This logic suggests the following hypothesis:

H5: CSR plays a complementary role to corporate governance such that when corporate governance is weak, firms that engage in higher levels of CSR activity are likely to survive longer.

3. Data, Sample Selection, and Summary Statistics

3.1 Sample selection

Our sample consists of general U.S. firms listed between January 1st, 2000 and December 31st, 2013. We merged the CSR data with accounting data from Compustat and stock prices and delisting information from the Center for Research in Security Prices (CRSP). CRSP provides codes to indicate the status of the issuing firm, such as survival (code < 200), merger (code 200–300), exchange (code 300–400), liquidation (code 400–500) and dropped (code 500–600). Each firm is tracked to the end of 2018 or its delisting date if earlier. Financial firms with Standard Industrial Classification (SIC) codes 6000–6999 and utility firms with SIC codes 4900–4999 were excluded from the sample. Observations with missing values were also deleted. Our final sample consists of 2,622 firms with 17,378 firm-year observations.

We obtained the CSR ratings data from the MSCI ESG (STATS) database, previously known as the KLD Research & Analytics database. This provides an assessment of a firm's exposure to (and management of) ESG risks and opportunities according to three principal types of source: (i) macro data at the segment or geographic level; (ii) company reporting and disclosure; (iii) data from other stakeholders, such as media and government. Started in 1991, each year the MSCI ESG rates the 650 companies that together comprise the MSCI KLD 400 Social Index and the MSCI USA Index. In 2001, this scope was expanded to also include the 1000 largest U.S. companies by market capitalization and, in 2003, to companies comprising the MSCI USA IMI Index.

In this study, we consider six dimensions of CSR performance: environment, community, human rights, employee relations, diversity, and product. However, it is possible that CSR is simply a proxy for corporate governance and our results may be biased as a result of omitted variables. Therefore, we use the governance dimension as a control variable in our baseline analysis. For each of the six dimensions, MSCI ESG provides a rating (either 0 or 1) of a number of strengths and concerns (or weaknesses). For example, MSCI ESG assigns a 1 to the "climate change energy efficiency strength" of the environment dimension if a firm is taking proactive steps to manage and improve the energy efficiency of its operations, and a 0 to the "tax disputes concern" of the community dimension if a firm has recently been involved in major tax disputes. We compute the net CSR score for each dimension, which equates to the difference between total strength ratings and total concern ratings. We also aggregate the net score across all six dimensions to generate an overall CSR score. Detailed indicators for CSR activities are provided in the internet appendix.

3.2 Sample distribution

Table 2 presents the distribution of our sample by firm delisting type, year and industry. Panel A reports the distribution of three subsamples categorized by trading status: 53% of firms survived within the sample period, 42% were acquired and 5% failed. Surviving firms are those that were still in operation at the end of 2018; acquired firms are those that were merged or acquired during the period; failed firms are defined as those that delisted involuntarily as a result of liquidation or financial distress. Surviving firms demonstrated a higher mean of CSR than those that were acquired or failed. In addition, the mean CSR for the surviving firms is positive, whereas for the other two categories it is negative.

Panel B depicts the distribution of observations across years and the survival rates of high-CSR and low-CSR firms. In 2003, there is a considerable increase in the number of firms included in the sample as the coverage of the MSCI ESG database expands. Starting in 2000, there is a downward trend in mean CSR, which rebounds after 2010. This latter uplift may be a result of the global financial crisis of 2008–09, which highlighted the importance of trust in corporate affairs and drew greater public attention to CSR. We can also see that high-CSR firms are less likely to delist, with a better survival rate of 69.77% than the 63.66% rate for low-CSR firms. This pattern applies for every year in the undifferentiated sample with the exception of 2000, when the Internet bubble burst. Panel C of Table 2 documents the sample distribution by industry, classified by two-digit SIC codes. Our observations concentrate on chemical products, and computer equipment and service, as well as the wholesale and retail trade sector. Four of the 14 sectors in our sample have a positive CSR average: food and beverage, chemical products, computer equipment and service, and electronic equipment. Within every industry but one, high-CSR firms demonstrate a higher survival rate than low-CSR ones. The only exception is the wholesale and retail trade sector, although the difference between the survival rates for the high- and low-CSR firms is marginal (72.03% and 72.83%, respectively).[5]

4. Empirical Tests and Results

To examine the association between CSR and firm survival, we employ a semiparametric approach by utilizing a Cox proportional hazards model. Compared with traditional parametric regression models

[5] We provide further analysis on the summary statistics in Table A.2 of the internet appendix.

such as the ordinary least squares (OLS) and probit/logit models, survival analysis has several advantages, including the ability to deal with censored data and time-series data with different time horizons. Specifically, the limited duration of our sample period generates right-censored observations, which means that some firms may never encounter failure. A Cox model provides robust results regardless of the distribution of survival time (Baumohl et al., 2019). We estimate the following model:

$$\mathrm{h(t)} = \mathrm{h_0(t)} exp\left[\beta_1 High\ CSR_{i,t} + \beta_2 Control\ Variables_{i,t} + Fixed\ Effects\right] \qquad (1)$$

where β is the parameter to be estimated, t is survival time and $\mathrm{h_0(t)}$ is the baseline hazard function obtained when all covariates are set to zero. The dependent variable $\mathrm{h(t)}$ indicates the risk of failure. We focused on the variable *High CSR*, an indicator variable that takes a value of 1 if a firm has high CSR levels (i.e., the firm's net CSR score is above the sample median) and 0 otherwise. For example, a positive coefficient denotes a high probability of firm failure and a short survival time; a negative coefficient indicates a low failure probability and a long survival time. In addition, to quantify the risk of default we compute the hazard ratio for each parameter by taking the exponent form of the coefficient. More specifically, a hazard ratio greater than 1 increases the likelihood of firm default, whereas a hazard ratio below 1 indicates that the covariate increases the probability of firm survival.

We then expand our analysis with nonparametric estimates of hazard and survival functions. By employing these functions, we can compare the risk of failure as well as the survival profile among the high- and low-CSR firms. Put another way, the hazard function of firms with high levels of CSR activity should be below that of firms with low CSR levels, and vice versa for the survival function. To estimate the hazard and survival functions, we employ, respectively, the Nelson–Aalen cumulative hazard and the Kaplan–Meier survival estimates, which are defined as follows:

$$\widehat{\mathrm{H}}(\mathrm{t}) = \sum_{t_i \le t} \frac{d_i}{n_i} \qquad \text{(Nelson–Aalen hazard estimate)} \qquad (2)$$

$$\widehat{\mathrm{S}}(\mathrm{t}) = \prod_{t_i \le t} \frac{n_i - d_i}{n_i} \qquad \text{(Kaplan–Meier survival estimate)} \qquad (3)$$

where d_i is the number of firms delisting at time t_i, and n_i is the number of firms under observation at time t_i.

Figures 1 and 2, respectively, project the Kaplan–Meier survival and Nelson–Aalen cumulative hazard functions for firms with high (*highcsr* = 1) and low CSR (*highcsr* = 0) activity levels. Our findings

suggest that the survival function of high-CSR firms is above that of low-CSR firms, that the hazard function of high-CSR firms is below that of low-CSR firms, and that the gap between high- and low-CSR firms becomes even wider as time passes. That is, we provide evidence that high levels of CSR activity increase the likelihood of firm survival. As a robustness check, we perform a log-rank test for the survival difference between the two groups of firms: the result is consistent and significant at the 1% level.

Panel A of Table 3 shows the results from Equation (1), which assesses the effect of *High CSR* and *CSR net score* on the probability of failure after controlling for various firm-level characteristics (see Specifications 1 and 2, respectively). We find that the coefficient on *High CSR* is negative and significant at the 1% level. To better interpret our findings, we also present each parameter β in the form of a hazard ratio, which measures the marginal effect of an independent variable. Specifically, a statistically significant hazard ratio indicates to what extent the probability of a firm exiting the market is multiplied when our proxies of CSR alter by one unit. A negative coefficient implies a hazard ratio below 1, suggesting that an increase in the covariate (i.e., better CSR performance) reduces the delisting risk (i.e., increases the survival rate). From Panel A, the hazard ratio of *High CSR* firms is 0.935, indicating that those firms are 6.5% (1 – 0.935 = 0.065) less likely to delist than firms with low CSR. Similarly, a one-unit improvement in *CSR net score* could increase a firm's survival probability by 2% (1 – 0.980 = 0.020). Both results are consistent with our findings from the Kaplan–Meier survival and Nelson–Aalen cumulative hazard functions, suggesting that high-CSR firms experience lower probability of default (higher probability of survival), supporting hypothesis H1.

In Panel B of Table 3, we explore the degree to which each of the six CSR dimensions influences a firms' probability of failure. We find the coefficients of four of the six CSR dimensions to be negative and highly statistically significant (the coefficients of the humanity and diversity dimensions are insignificant). This suggests that some CSR dimensions are more important than others in influencing the probability of default; that is, firms that put more weight on environmental protection, community engagement, employee relations, and product safety and quality are more likely to survive in the long run. Of these four dimensions, the environment and community dimensions contribute most to the prolongation of corporate lifespans. We argue that firms with high senses of environmental responsibility and community responsibility are, respectively, 23.5% and 18% less likely to delist than firms with low manifestations of these dimensions. For the CSR dimensions of employee relations and product safety and quality, the hazard ratios are, respectively, 11.8% and 12.8%.

As far as the results for the control variables are concerned, we find that highly leveraged firms experience lower survival rates, while larger firms with better financial performances (*ROA* and *Gross margin*), higher market values (*M/B*), higher dividend payouts, greater investments in R&D, and greater tangibility tend to display lower risks of default. Furthermore, firms audited by a "Big N" auditor are more likely to survive. Finally, we do not find a significant influence for corporate governance on the potential risk of failure.[6]

4.1 Pandemics, climate change, and firm survival

The COVID-19 pandemic has caused severe disruption to businesses across all sectors, and firms are faced with navigation of a new economic landscape to ensure long-term survival. In the midst of these challenging times, CSR is expected to contribute toward the well-being of society. For instance, Starbucks is expanding its mental health benefits for employees to include up to 20 therapy sessions; in a similar vein, Microsoft has committed to continue paying its hourly workers their existing rate, even though global demand has slowed.

To explore the potential impact of CSR activities on firms' short-term performance and long-term survival during a pandemic, we consider the number of positive influenza tests reported to the CDC by Public Health Laboratories during the period 2000–2013. The results in Panel A of Table 4 show that high-CSR firms have greater survivability than low-CSR firms and this effect is more pronounced in regions that experience higher infection rates, indicated by the negative and significant coefficient on the interaction between *High CSR* and *High infection region*.[7] *High infection region* is an indicator variable that takes a value of 1 if the annual infection rate for the region is above the median level for all regions, and 0 otherwise. In Panel B we generate an indicator variable, *Peak year*, which highlights the 2003 SARS and 2009 H1N1 peak years of the respective pandemics. The coefficients on the interaction term *High CSR*Peak year* are significant and larger than those on *High CSR* alone, suggesting a positive association between corporate social performance and financial performance during pandemic years. The estimated hazard ratio for the interaction term is 0.899, which indicates that firms with high levels of CSR activity are about 10% more likely to survive when encountering challenges from pandemics than those without. In Panel C, we also

[6] We also control for religiosity, i.e., the ratio of the number of religious adherents in the firm's state to the total population in that state as of 2010. The results (not tabulated) remained qualitatively the same.

[7] The U.S. Department of Health and Human Services (HHS) divides the country into 10 regions, with a regional office located within each. For example, the states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont are classified as Region 1. For more information on HHS regions see Table A.14 in the internet appendix.

investigate the effects of CSR on regional pandemics. We find that for HHS regions that have higher median CSR scores or a larger number of high-CSR firms, the future pandemic infection rate is significantly lower than in other regions.

To investigate how climate change affects high-CSR firms' performance and survivability, we use two variables: (1) an indicator variable that measures CO_2 emissions per capita in each state; (2) the absolute value of mean temperature variation in the 20 years prior to our sample. The CO_2 indicator (*Low CO2 state*) equates to 1 if per-capita CO_2 emissions in the state where the firm's headquarters are located are lower than the median level, and 0 otherwise. States that energetically advocate low-carbon, energy-saving and environmental protection policies are more likely to experience low levels of CO_2 emissions. Such constraints on corporate activities may result in higher operating costs and thus cause weaker financial performance or even threaten firm survivability. However, high-CSR firms in low-CO_2 states are already demonstrating greater care in reducing emissions and protecting the environment and are less likely to be negatively influenced by the associated regulation. In addition, firms with better social performance will have more opportunities to receive government support such as subsidies. We therefore expect that high-CSR firms will survive better in low-emission states, performing better than low-CSR firms.

Large temperature variations also bring more uncertainty to operating conditions. In our analysis, we utilize the absolute value of temperature change rather than the actual anomaly value because both upward and downward changes in temperature reflect the extent of climate change exposure. We anticipate a negative association between state temperature change and corporate performance. However, when extreme levels of temperature are experienced, public awareness of the importance of CSR is raised, which may cause firms with high CSR levels to be favored over those with low CSR levels. Therefore, we predict that high-CSR firms will survive longer in conditions of more apparent temperature variation.

In Panel A of Table 5, we run a Cox survival model on the interaction terms *High CSR*Low CO2 state* and *High CSR*Tempchange*. As can be seen, while firms in low-CO_2 states generally struggle to survive, those with high CSR levels have better survival rates, as illustrated by the negative and significant coefficient on the *High CSR*Low CO2 state* interaction. The hazard ratio of 0.848 indicates a 15.2% increase in the likelihood of survival when firms perform better in the social and environmental dimensions of CSR. This is consistent with the evidence in first two columns of Panel B of Table 5, which show a positive correlation between the *High CSR*Low CO2 state* interaction term and, respectively, ROA and Tobin's q. While ROA measures short-term performance, Tobin's q is indicative of longer-term corporate value. Although we find that firm performance may be adversely affected by *Low CO2 state* in the short

run, the positive effect of the latter on Tobin's q suggests a beneficial effect on a firm's long-term growth from low-emissions policies. In terms of the impact of temperature change, we find it has a negative influence on short-term corporate performance. Furthermore, we find that during periods of more substantial temperature variation, firms with high CSR levels tend to demonstrate better financial performance and survive longer than firms with low CSR levels.

5. Endogeneity

In this section we address potential endogeneity concerns using an instrumental variable (IV) analysis, a Heckman two-stage procedure, and a propensity score matching (PSM) analysis.

5.1 Instrumental variable analysis

Identifying the impact of CSR on firm survivability poses an empirical challenge. For example, the decision to engage in CSR activities and the risk of firm delisting may be jointly determined, or both may correlate with unobservable corporate characteristics or omitted variables such as climate uncertainty, the stability of the local community, or managerial traits. To mitigate the effect of unobservable omitted variables and compensate for endogeneity, we use an instrumental variable (IV) approach. The instruments we use are the Palmer Drought Severity Index (PDSI), the state divorce rate, and the infection rate. Our instrument selection was motivated by several factors. First, scientific evidence demonstrates a recent rise in global average temperature (Intergovernmental Panel on Climate Change, 2014), with chronic hazards such as drought and rising sea levels intensifying. These increasing climate-related risks not only put pressure on firms' operations but also heighten public awareness of corporate social performance. Therefore, we expect both self-consciousness and market pressure to contribute to increased levels of CSR activity and for this to be more apparent in states that have experienced higher temperatures (and thus more severe drought conditions). More specifically, the PDSI, reported by the National Oceanic and Atmospheric Administration (NOAA), quantifies long-term droughts on the basis of a combination of data regarding precipitation, temperature, and soil moisture. It represents the accumulation or deficit of water over a long-term period (about nine months), and has been widely used to identify long-term agricultural and hydrological drought and to characterize the abnormality of a particular drought in a particular region. A PDSI value generally ranges from –10 (dry) to +10 (wet), but more extreme values are possible. Thus, a lower PDSI value represents more severe drought conditions. Consequently, we expect a negative correlation between CSR and PDSI.

Second, we consider the potential influence of local divorce rates on firms' CSR activities. Divorce is not only a personal event but also a reflection of more general social issues. For example, high divorce rates may be associated with the lack of a sense of security as well as of responsibility and trust, which are important factors in relation to a firm's CSR activities. Hence, we use the state-level divorce rate as another instrument for CSR and anticipate a negative impact on corporate social performance. Finally, during a pandemic, the economy is confronted with huge challenges, such as unemployment and supply chain disruption. Whether voluntarily or otherwise, firms typically engage in more CSR activities, such as food donation and employee care, when infection rates are high in the regions where firms are located. We compute regional infection rates as the percentage of positive influenza tests reported to the CDC by Public Health Laboratories, and expect a positive effect for infection rate on CSR activity.

To conduct our IV analysis, we ran the following first-stage regression to instrument for CSR:

$$CSR_{i,t} = \beta_0 + \beta_1 Instrument_{i,t} + \beta_2 Control\ Variables_{i,t} + IND\_FE + YR\_FE + \varepsilon_{i,t} \quad (4)$$

In both the first and second stages of our IV analysis, we use the same set of control variables as those used in Table 3. We also control for industry and year fixed effects.[8] Table 6 provides evidence consistent with our predictions. Thus, in Panel A, we run the first-stage regression with two CSR measures (*CSR net score* and *High CSR*). Our estimates show that CSR is negatively associated with the state divorce rate and PDSI, and positively associated with the regional infection rate. In the second step, we estimate a Cox model, as in Equation (1), using the predicted values of CSR from the first-stage regression. Our parameter estimates (see Panel B) indicate that, after considering the potential influences of unobservable omitted variables, firms with higher CSR activities are less likely to delist. To provide further support for our choice of instruments, we also perform the Cragg and Donald (1993) test to confirm the relevance of the IVs, and the Sargan (1958) overidentification test to examine their exogeneity. The F-statistics in the first stage exceed the critical value, indicating that our instruments satisfy the relevant condition required for a valid instrument and that they are not weak. Moreover, the *p*-values of the Hansen J-test statistics are 0.173 and 0.355, respectively, for *CSR net score* and *High CSR*, suggesting that our IVs pass the overidentification test and are not endogenous.

In addition, in untabulated analysis, we employ the per-capita CO_2 emissions from fossil fuel combustion in the state where the firm is headquartered, as well as the percentage of each state's population

[8] We also consider the geographic peer effect, i.e., firms operating in the same state, to control for state fixed effects; results remain unchanged and are available upon request.

that volunteers for non-profit and community organizations, as instruments for firms' CSR performance. We find that firms that are located in states with low CO_2 emissions and high volunteering rates show more social responsibility than those located in states with high CO_2 emissions and low volunteering rates. According to the Hansen J-test statistic, neither instrument is endogenous.[9]

5.2 Heckman two-stage procedure

A firm's decision to invest in CSR-related activities may be associated with specific corporate characteristics. For instance, highly profitable firms may have more financial resources to invest in CSR than poorly performing ones. In this case, the statistical significance of our main coefficients may be driven by self-selection bias. To address this issue, we employ a Heckman (1979) two-stage regression: in the first stage, we use a probit model to estimate the probability of a firm opting for a high-CSR strategy as follows:

$$\begin{aligned}\text{Prob}[High\_CSR = 1] = Probit(&\gamma_0 + \gamma_1 Leverage_{i,t} + \gamma_2 ROA_{i,t} + \gamma_3 GrossMargin_{i,t} + \gamma_4 Size_{i,t} + \\ &\gamma_5 R\&D_{i,t} + \gamma_6 (\tfrac{M}{B})_{i,t} + \gamma_7 Dividend_{i,t} + \gamma_8 Tangibility_{i,t} + \gamma_9 BigN_{i,t} + \gamma_{10} Governance_{i,t} + \\ &\gamma_{11} Anomaly\ Palmer\ Index_{i,t} + \gamma_{12} SNAP_{i,t} + IND\_FE + YR\_FE + \varepsilon_{i,t}) \end{aligned} \quad (5)$$

We incorporate various determinants of CSR investment as well as controlling for industry and year fixed effects.[10] One condition of such a Heckman econometric technique is that it requires exogenous variables that are correlated with a firm's propensity to select a high-CSR strategy, but not with survivability. To satisfy this exclusion restriction and to account for the exogenous shocks of climate change and poverty levels, we utilize the Palmer Z Index and the Supplemental Nutrition Assistance Program (SNAP) for each state (see Table 7).[11] The Palmer Z Index reflects meteorological and short-term agricultural droughts. Its anomaly value for each state is calculated as the difference between an annual Palmer Z Index and its mean value during the 20 years prior to the sample period:

$$Anomaly\ Palmer\ Index_{i,t} = Palmer\ Z\ Index_{i,t} - Mean\ Palmer\ Z\ Index_{i,1980-1999} \quad (6)$$

[9] The results are reported in Table A.5 in the internet appendix.
[10] Namely, leverage, ROA, gross margin, firm size, R&D intensity, market-to-book value, dividend payout, tangibility, "Big N" auditing, and governance.
[11] The data for the Palmer Z Index were retrieved from the National Oceanic and Atmospheric Administration (NOAA). The data for SNAP were retrieved from FRED, Federal Reserve Bank of St. Louis.

SNAP is the percentage, for each state, of participants in the Supplemental Nutrition Assistance Program. We find that both of these variables are negatively correlated with the probability of a firm pursuing high-CSR policies, which indicates that firms located in states that encounter more severe drought conditions are more likely to engage in CSR activities, while firms located in states with higher poverty levels (higher SNAP percentage) are less likely to do so.

In the second stage, we re-estimate the Cox proportional hazard model of Equation (1) to include the inverse Mills ratio (IMR) as an independent variable. The coefficient of IMR remains significant, suggesting that it is important to control for potential selection bias. Notably, our results remain unchanged despite the inclusion of IMR: that is, firms with high levels of CSR are less likely to default. This latter supports hypothesis H1.

6. Cross-sectional Analyses

In this section, we examine whether the positive link between CSR and firm survival remains when firms operate in more competitive environments and are monitored more effectively. For instance, in a more competitive market, socially responsible firms are more likely to create a good impression among customers (Simmons and Becker-Olsen, 2006). On the one hand, in such circumstances, CSR could represent a successful marketing strategy, further improving a firm's competitive advantage and thereby extending its survival; on the other hand, it is possible that firms facing fierce competition reduce failure risk by other means, such as improving operations-related (rather than CSR-related) activities. To investigate whether the positive link between CSR and firm survival is pronounced or weakened as a result of variations in competition, we employ the Herfindahl–Hirschman index (HHI) of market concentration: a high HHI suggests that a firm is operating in a highly concentrated industry and a low-competition environment. Specifications 1 and 2 in Table 8 show our results in relation to industry competition. We find that firms with high-CSR policies are 12% less likely to delist in a highly competitive market, and that CSR activities are more important for firms in industries involving high competition. These findings support hypotheses H1 and H4: that firms with high levels of CSR are less likely to default, and that the positive association between CSR and firm survival is more pronounced in highly competitive industries.

In addition, we explore the role of corporate monitoring on the relation between CSR and firm survival. We use the entrenchment index (E-index) of Bebchuk et al. (2009), which is obtained from MSCI ESG Governance Metrics, to proxy for the level of internal enterprise governance (a high E-index indicates poor governance), together with the percentage of stocks held by all institutional shareholders (institutional

ownership) as an indicator of external monitoring levels. We observe that high levels of CSR prolong survival periods in poorly governed firms and those with low levels of institutional ownership (see Specifications 3 and 6 of Table 8). There results highlight the complementary role that CSR plays in relation to corporate governance, and supports hypothesis H5. Overall, we highlight CSR as being important for firms with weak governance (either internally or externally) that operate in competitive industries for two reasons: first, although it may have a disciplinary effect, competition can also induce managers to manipulate financial outcomes, suggesting that firms operating in fiercely competitive environments are not always efficiently monitored; second, while firms are more likely to fail when operating in highly competitive industries, a greater degree of engagement in CSR activities can help them differentiate themselves from their competitors, thus prolonging their survival.[12] In the same vein, in firms with entrenched management and lower levels of institutional ownership, a greater level of CSR activity helps to discipline managerial behavior and thus improve firm survival times.

In untabulated analysis, we further test whether CSR is a more or less important determinant of corporate survival on the basis of firms' age and size. To achieve this, we re-estimate the baseline Cox model on subsamples of older/younger and larger/smaller firms.[13] We find that CSR is more essential to the survival of older and larger firms, with younger and smaller firms that lack CSR activities being less prone to failure. Policies that advance a firm's social responsibility agenda may impose serious financial constraints as a result of the significant costs of promoting them, for instance through media exposure, and may also require substantial managerial experience, which in most cases is gained over time. This might explain why CSR matters more to the survival of older and larger firms than it does to that of smaller and younger ones.

7. Channels Through Which CSR Activities Affect Firm Survival

Our findings thus far have shown that firms with high levels of CSR are more likely to survive. In this section, we seek to identify and analyze the most important channels through which this may occur. Having argued that high-CSR firms may achieve their better financial performance and longer survival times by attracting and satisfying more employees, observing higher environmental standards, making more

[12] In order to mitigate the threat of a potential dismissal or firm liquidation and takeover, or just to receive future financing (Bergstresser and Philippon, 2006).
[13] Due to space limitations, we report the regression results in Table A.6 in the internet appendix.

corporate philanthropic contributions, improving customer satisfaction, gaining better access to finance, and encouraging corporate governance to discipline management behaviors, we now test these hypotheses.

7.1 CSR dimensions and firm performance

To assess the link between the six CSR dimensions and corporate performance, we estimate the following regression equation:

$$Financial\_Performance_{i,t} = a + \beta Dimension_{i,t} + \gamma Z_{i,t} + IND\_FE + YR\_FE + \varepsilon_{i,t} \qquad (7)$$

where *i* is the firm, *t* is the time, ROA is used as a proxy for financial performance, *Dimension* is a vector of the six dimensions of CSR, and *Z* is a vector of control variables, as in Table 3. We also estimate all regressions by including industry effects, defined at the 2-digit SIC code level, as well as year fixed effects.

Table 9 shows the results derived from Equation (7). We find that for four of the six CSR dimensions there is a positive and economically significant link to corporate financial performance (see Specifications 1 to 6). For instance, the coefficients in Specifications 2 and 4 suggest that a one-interquartile-range increase in CSR dimension (in these cases, *ComHi* and *EmpHi*) is associated with, respectively, a 0.027 and 0.025 increase in *Financial_Performance*. The economic impact of this effect is substantial, given that the sample mean of *Financial_Performance* (proxied by ROA) is 0.015. As an additional robustness test, we run the model of Equation (2) with all six CSR dimensions concurrently: qualitatively, the results are the same.[14]

We also consider Tobin's q as an alternative proxy of corporate financial performance, running Equation (2) again, including the same CSR dimensions, vector of control variables, and industry and year fixed effects. We find the relationship between the six CSR dimensions and firm performance to be invariant (positive and statistically significant) to the inclusion of this alternative financial performance indicator. The results are statistically and economically consistent for both proxies of financial performance. More specifically, on average, a one-standard-deviation increase in the net CSR score is associated with a 5.23% higher ROA and a 2.99% higher Tobin's q.

To further test whether financial performance is indeed a channel through which CSR enhances firm survival, we compared the Cox model estimates with and without these two proxies of financial performance: our estimates show that both ROA and Tobin's q have negative and significant coefficients. More importantly, the risk of failure for firms with high levels of CSR activities is 18.3% lower when

[14] Due to space limitations, the results are not reported here but are available upon request.

proxied by firm performance than in the case in which performance was excluded from our regression analysis. To further corroborate our results, we test the statistical significance of the difference between the coefficients on CSR with and without these proxies and observe these differences to be statistically significant at the 1% level.

7.2 CSR and access to external finance

In this subsection, we test whether the positive association between CSR and corporate survival is driven by a firm's enhanced ability to access external finance. To achieve this, we construct three proxies for capital constraints, the KZ index of Baker et al. (2003), the SA index of Hadlock and Pierce (2010), and the WW index of Whited and Wu (2006) and run regressions similar to Equation (2) using each as a dependent variable.[15] We then examine whether the coefficients of CSR in these regressions are negative and statistically significant. The results are shown in Table 10, Panel A. We find that firms with high levels of CSR (or high *CSR net score*) are negatively associated with all three indices, and most of the coefficients are statistically significant at the 1% level. This suggests that high-CSR firms are less likely to encounter financial constraints.

In Panel B, we regress these three financial constraint indices against the probability of failure in the Cox model of Equation (1), while including the same set of control variables together with industry and year fixed effects, to test whether increased access to funds is one channel through which high-CSR firms may increase their likelihood of survival. We find that, while the coefficients on CSR remain negative, the magnitudes of these coefficients reduce quite substantially after controlling for capital constraints. In summary, we argue that the higher a firm's CSR involvement, the better its access to finance and, in turn, the higher its probability of survival, suggesting that reduction of capital constraints is, indeed, a channel through which firms with better CSR performance enhance their survivability.

7.3 Poor performance and CEO turnover

Under the shareholder expense view, entrenched managers may use CSR to collude with stakeholders in order to pursue their own self-interest, such as personal reputation. If this is the case, then the negative relationship between CEO turnover and corporate performance would be less pronounced in firms with high CSR levels. To rule out this possibility and provide further evidence in support of our

[15] See the internet appendix for more detail of how we estimated these indices.

hypotheses, we test the impact of CSR on the performance–turnover association using the following equation:

$$CEO\ turnover_{i,t} = \beta_0 + \beta_1 Poor\ Performance_{i,t} + \beta_2 CSR_{i,t} + \beta_3 Poor\ Performance_{i,t} * CSR_{i,t} + \beta_4 Leverage_{i,t} + \beta_5 (\frac{M}{B})_{i,t} + \beta_6 Size_{i,t} + \beta_7 Firm\ Age_{i,t} + \beta_8 CEO\ Age_{i,t} + \beta_9 CEO\ Gender_{i,t} + \beta_{10} CEO\ Tenure_{i,t} + IND_{FE} + YR_{FE} + \varepsilon_{i,t} \quad (8)$$

where *CEO turnover* is an indicator variable that equates to 1 if the CEO has been changed in a given year. Our regression results are shown in Table 11. The main variables of interest are *Poor Performance*CSR net score* in column (1) and *Poor Performance*High CSR* in column (2), the coefficients of both of which are positive and significant, indicating that CEOs in more socially responsible firms have a higher dismissal risk when delivering a poor performance than those in low-CSR firms, mitigating the concern about managerial entrenchment through CSR activity. The disciplinary effect of CSR on CEO effort could also be regarded as a channel through which firm delisting risk is reduced and the survival period of a firm is extended. To test this conjecture, we incorporate the indicator of poor firm performance and the interaction between this and CEO turnover into the original Cox model. The results are shown in Table 11, Panel B. The coefficients on poor performance are positive and significant, a finding consistent with the notion that firms are less likely to survive if they perform weakly. However, the negative coefficients on the interaction term indicate that firm survivability is likely to increase if a poorly performing firm changes its CEO. We also note that although CSR still has a positive effect on firm survival after controlling for performance and CEO turnover, this effect becomes insignificant (in contrast to the results in Table 4), which confirms that the disciplinary role of CSR on CEO effort is an important channel by which it reduces a firm's risk of delisting.

7.4 CSR and labor productivity

CSR activities may enhance corporate survival by raising employee morale and productivity. Balakrishnan et al. (2011) document that employees have more incentives to contribute to organizational endeavours when firms behave in socially responsible ways (i.e. corporate giving), indicating that CSR serves as an effective endeavour for motivating employee efforts. To test this conjecture, we utilize the natural log of the ratio of sales to the total number of employees in each firm as a proxy for labor productivity (*Productivity*). Table 12 presents the findings of the associated analysis. In Panel A, we find that in firms with high levels of CSR, employees tend to be more productive, which is consistent with our

conjecture. We further include *Productivity* as an additional control variable and re-estimate the Cox model. Panel B shows that *Productivity* has a positive impact on firm survival, suggesting that labor productivity is another important channel through which CSR reduces firm delisting risk.

8. Robustness Tests

8.1 Alternative CSR indicators

In the Cox model of Equation (1), we measure the overall CSR activity of firms by taking the difference between the total strength and total concern scores in each of the six CSR dimensions. However, the number of indicators can vary annually, making direct comparison between years and dimensions less accurate (Deng et al., 2013). We therefore adjust the strength and concern scores of each dimension by taking into account the respective number of indicators and subtracting the total adjusted score of concern from the total adjusted score of strength to obtain an overall adjusted CSR score.[16] In an untabulated analysis, we observe that our primary finding that firms with high CSR levels are less likely to default is robust to the implementation of alternative CSR indicators, that is, *Adjusted High CSR* and *Adjusted CSR net score*.[17] This finding supports hypothesis H1.

8.2 Alternative approach to survival analysis

We re-estimate Equation (1) utilizing different assumptions in terms of survival distribution (such as the exponential, Weibull and Gompertz survival models), the Accelerated Failure Time (AFT) model, and the Competing Risk (CR) model. In an untabulated analysis, we report that the impact of CSR activities on firm survival is invariant to these different distribution assumptions as well as to the AFT and CR modeling; that is, even after considering alternative ways of testing probability of survival, we find that firms with high levels of CSR are less likely to delist.[18] This result supports hypothesis H1.

[16] For example, if the strength scores of a firm's six CSR dimensions are 2, 1, 0, 1, 3, and 2 and the numbers of strength indicators of each dimension are 5, 3, 2, 9, 6, and 3, then the adjusted total strength is computed as 2/5 + 1/3 + 0/2 + 1/9 + 3/6 + 2/3 = 2.01. Suppose that the adjusted total concern for the same year is 1.51; then the overall adjusted CSR score is 2.01 – 1.51 = 0.5.
[17] The results are reported in Table A.7 in the internet appendix.
[18] The results are reported in Table A.8 in the internet appendix. The opposite sign in the coefficient of the CR model is solely due to the difference in metrics.

8.3 Different causes of delisting: Acquisition or failure

Thus far, we have focused on the survival function, which estimates the likelihood of survival for firms with various levels of CSR. However, this mechanism does not consider alternative causes of delisting, such as acquisition, liquidation, and so on. Furthermore, we acknowledge that firms that delist as a result of acquisition (firms that merge with or are acquired by another firm) may have different characteristics to those going out of business due to liquidation. Overlooking this structural difference may lead to biased coefficient estimates. To address this concern, we employ the competing-risks model that focuses on the cumulative incidence function and allows for a more thorough investigation of the reasons behind delisting. In particular, we estimate the model with two competing risks: that of acquisition and that of failure (where failure represents firms that delisted because of liquidation or financial distress). We find that high-CSR firms are less likely to be acquired or to fail. In addition, we find that CSR activities are more effective in protecting firms from delisting due to liquidation or financial distress than from delisting through acquisition.[19]

8.4 The global financial crisis

We observe that the yearly mean CSR score begins to increase after the global financial crisis of 2008–09 (although too often we refer to this crisis as a global one, when the recent COVID-19 pandemic has redefined our perception of a true global crisis). One explanation derives from the associated erosion of trust (Chambers and Dimson, 2009), which has increased public interest when it comes to firms' CSR activities. Lins et al. (2017) argue that high-CSR firms raised more funds during the crisis period, but Buchanan et al. (2018) provide inconsistent evidence: while high-CSR firms had higher corporate valuations before the crisis, they experienced higher losses during it.

To further test whether the positive association between CSR and firm survival differs between pre- and post-crisis periods, we construct the interaction terms *High CSR*Pre-crisis* and *High CSR*Post-crisis* and re-estimate the Cox model of Equation (1). The pre- and post-crisis indicators take a value of 1 before and after the crisis, respectively, and 0 otherwise. Our analysis highlights the incremental effect of CSR on firm survival after the 2008–09 crisis.[20]

[19] The results are reported in Table A.9 in the internet appendix.
[20] The results are reported in Table A.10 in the internet appendix.

8.5 Financially distressed firms

Deckop et al. (2006) argue that CSR-related investments are more likely to benefit firms in the longer run. Specifically, companies may sacrifice short-term profit to implement recycling and pollution-prevention programs that they will capitalize on in the future. Reputational effects associated with high CSR levels are also difficult to capitalize immediately (in the short term). Moreover, some CSR activities may turn out to be costly and non-beneficial to firms: thus, we find that two dimensions of CSR – human rights and diversity – are not effective in improving the probability of corporate survival. Such a cost-benefit analysis should be of concern to managers in financially distressed firms who cannot afford to sacrifice precious resources on potentially non-effective investments. Consequently, we use an interaction analysis to examine whether it pays firms under financial pressure to invest in CSR programs. Our parameter estimates indicate that when firms are financially constrained, it is less efficient to invest in potentially costly CSR policies that will stretch the financial positions of such firms to their limits and thereby increase their risk of failure. [21]

9. Conclusion

In this study, we use a Cox proportional hazards model to analyze the relationship between a firm's CSR performance and its survival probability in the context of the exogenous shock of pandemic disease and climate change. We conjecture that better corporate social performance is associated with a lower probability of corporate failure and a longer survival period. We report that four CSR dimensions (environment, community, employee relations, and product) out of six are positively related to firm survival. We document that a firm's engagement in CSR activities in times of pandemics and adverse climate conditions is a crucial factor in firm survival. These results remained robust after correcting for endogeneity bias and using alternative CSR measures and a variety of survival analysis models. Moreover, the positive association between CSR and firm survival is stronger when firms operate in more competitive industries and when governance (both internal and external) is weak. Finally, we show that better financial performance, fewer capital constraints, CEO behavioral discipline, and higher labor productivity are all channels through which firms with high CSR ratings improve their chances of survival. Overall, our results are supportive of the firm as a nexus of contracts theory, which suggests that the interests of shareholders

[21] Due to space limitations, our untabulated results are reported in Table A.11 of the internet appendix.

and other stakeholders (such as employees and customers) in high-CSR firms are in greater alignment than they are in low-CSR firms.

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Table 1. Definitions of variables used in the analysis of firm survival

Variable	Definition
Panel A: Variables used to measure CSR activities	
High CSR	Dummy variable that equates to 1 if the firm's CSR net score is above the sample median.
CSR net score	The net score of CSR rating based on the MSCI ESG data, measured as total strengths minus total concerns in six qualitative issue areas: Environment, Community, Human rights, Employee relations, Diversity, and Product.
Adjusted High CSR	Dummy variable that equates to 1 if the firm's adjusted CSR net score is above the sample median.
Adjusted CSR net score	The sum of yearly adjusted Environment, Community, Human rights, Employee relations, Diversity, and Product KLD STATS corporate social responsibility scores. Adjusted CSR is estimated by scaling the raw strength and concern scores of each category by the number of items of the strength and concern of that category in the year and then taking the net difference between adjusted strength and concern scores for that category.
EnvScore	Net score of environment ratings, calculated as the total strengths minus the total concerns in environment dimension of KLD rating data.
ComScore	Net score of community relations ratings, calculated as the total strengths minus the total concerns in community relations dimension of KLD rating data.
HumScore	Net score of human rights ratings, calculated as the total strengths minus the total concerns in human rights dimension of KLD rating data.
EmpScore	Net score of employee relations ratings, calculated as the total strengths minus the total concerns in employee relations dimension of KLD rating data.
DivScore	Net score of diversity ratings, calculated as the total strengths minus the total concerns in diversity dimension of KLD rating data.
ProScore	Net score of product ratings, calculated as the total strengths minus the total concerns in product dimension of KLD rating data.
EnvHi	Environment ratings dummy variable, equates to 1 when EnvScore is greater than the median, 0 otherwise.
ComHi	Community ratings dummy variable, equates to 1 when ComScore is greater than the median, 0 otherwise.
HumHi	Human rights ratings dummy variable, equates to 1 when HumScore is greater than the median, 0 otherwise.
EmpHi	Employee relations ratings dummy variable, equates to 1 when EmpScore is greater than the median, 0 otherwise.
DivHi	Diversity ratings dummy variable, equates to 1 when DivScore is greater than the median, 0 otherwise.
ProHi	Product ratings dummy variable, equates to 1 when ProScore is greater than the median, 0 otherwise.
Panel B: Variables related to firm characteristics	
Leverage	Ratio of total debts to total assets.
ROA	Return of asset, net income before extraordinary items scaled by lagged assets.
Gross margin	Ratio of gross profit to total sales.
Liquidity	Current liability divided by current assets.
R&D	Ratio of research and development expenses to book value of total sales.
Size	Natural logarithm of number of employees.
M/B	Market value of equity over book value of equity.
Dividends	Dividend relative to net income.
Profitability	Gross profit margin.
Tangibility	Ratio of gross value of property, plant and equipment to total assets.
Sales	The logarithmic ratio of sales to total assets.
BigN	Dummy variable that equates to 1 if the firm is audited by a "Big N" auditor, and 0 otherwise.
Governance	Net score of governance ratings, calculated as the total strengths minus the total concerns in the governance dimension of KLD rating data.
E-Index	The sum of six dummies reflecting the following anti-takeover provision: (1) a staggered board, (2) limits to amend the charter, (3) limits to amend bylaws, (4) supermajority voting requirements, (5) golden parachutes for executives, and (6) the ability to adopt a poison pill (Bebchuk, Cohen, and Ferrell, 2009), obtained from MSCI Governance Metrics.
Tobin's q	Market value of assets (total book value of assets minus book value of equity plus market value of equity) over book value of assets.
Institutional Ownership	The percentage of stocks held by all institutional shareholders.
Panel C: Other variables used in the analysis of firm survival	
HHI	Herfindahl–Hirschman index measured by the summation of squared market share of each firm within the same industry.
CEO turnover	Indicator variable based on whether the same individual holds the CEO title during the current and subsequent year, taking a value of 1 if the CEO has changed, and 0 otherwise.
CEO age	Natural logarithm of CEO age.
CEO gender	Dummy variable that equates to 1 if the CEO is male, and 0 otherwise.

CEO tenure	Natural logarithm of the number of years that the CEO is in office.
Palmer Z Index	Measure for short-term drought conditions with no memory of previous monthly deficits or surpluses.
PDSI	Palmer Drought Severity Index, measuring long-term droughts from a combination of precipitation, temperature, and soil moisture data.
Infection rate	Total cases divided by total specimens in each HHS region.
State divorce rate	Annual divorce rate in the state where the firm is headquartered.
State CO_2 emission	Per-capita CO_2 emissions from fossil fuel combustion in the state where the firm is headquartered.
Tempchange	The absolute value of mean temperature anomaly in the state where the firm is located compared to its mean value for the 20 years prior to the sample period.
State volunteer rate	Percentage of state's population that volunteer for non-profit and community organizations where the firm is headquartered.
Distress	Dummy variable equates to 1 if the leverage ratio of the firm is among the top quantile of the sample, and 0 otherwise.
Productivity	The natural log of the ratio of sales to the total number of employees in each firm.

Table 2. Sample distribution

The table presents the distribution of the overall sample and the three groups of firms: survived, acquired, and failed firms. Survived firms are those that are still trading (delisting code of 100). Acquired firms are those that are delisted due to acquisitions or mergers (delisting code from 200 to 299). Failed firms are those that are delisted for negative reasons (delisting code greater than or equal to 300). Panel B reports the yearly distribution of the full sample as well as the subsamples. Firms are classified as high(low) CSR firms if the net CSR score is above(below) the sample median. Panel C documents the 2-digit-level SIC code distribution of the sample. N denotes the number of observations.

Panel A. Distribution of U.S. firms from 2000 to 2013

	N	Pct.	Mean CSR
Survived	1,401	53.43	0.019
Acquired	1,102	42.03	-0.302
Failed	119	4.54	-0.821
Total firms in sample	2,622	100.00	

Panel B. Distribution of U.S. firms by year

			High CSR				Low CSR			
			Survive		Delist		Survive		Delist	
Year	Obs.	Mean CSR	Obs.	Pct.	Obs.	Pct.	Obs.	Pct.	Obs.	Pct.
2000	284	1.02	115	69.28	51	30.72	88	74.58	30	25.42
2001	492	0.52	136	63.26	79	36.74	169	61.15	108	38.85
2002	494	0.47	143	68.10	67	31.90	194	68.07	90	31.93
2003	1,319	-0.14	180	59.02	125	40.98	539	53.10	475	46.90
2004	1,423	-0.36	200	57.43	148	42.57	578	53.72	497	46.28
2005	1,405	-0.33	216	59.34	147	40.66	584	56.05	458	43.95
2006	1,420	-0.36	222	63.61	126	36.39	618	57.69	454	42.31
2007	1,450	-0.35	244	65.77	126	34.23	668	61.87	412	38.13
2008	1,503	-0.36	256	66.49	129	33.51	712	63.72	406	36.28
2009	1,539	-0.36	264	67.87	125	32.13	746	64.87	404	35.13
2010	1,587	-0.53	250	76.45	77	23.55	848	67.30	412	32.70
2011	1,509	-0.28	281	80.52	68	19.48	821	70.71	339	29.29
2012	1,539	0.61	373	81.44	85	18.56	791	73.17	290	26.83
2013	1,396	0.84	460	83.51	91	16.49	650	76.92	195	23.08
Total	17,360		3,340	69.77	1,444	30.23	8,006	63.66	4,570	36.34

Panel C. Distribution of U.S. firms by industry

			High CSR				Low CSR			
			Survive		Delist		Survive		Delist	
Industry (two-digit SIC codes)	Obs.	Mean CSR	Obs.	Pct.	Obs.	Pct.	Obs.	Pct.	Obs.	Pct.
Oil & Gas (13)	810	-1.16	69	70.41	29	29.59	482	67.70	230	32.30
Food, Beverage (20)	494	0.50	153	81.38	35	18.62	196	63.84	110	36.16
Chemicals & Allied Products (28)	2,043	0.10	459	70.99	188	29.01	856	61.43	540	38.57
Manufacturing (30–34)	891	-0.47	168	83.58	33	16.42	527	76.05	166	23.95
Computer Equipment & Service (35, 73)	3,459	0.21	655	59.55	445	40.45	1,374	58.22	985	41.78
Electronic & Other Electric Equipment (36)	1,676	0.20	320	64.39	177	35.61	683	57.93	496	42.07
Transportation Equipment (37)	473	-0.62	78	88.64	10	11.36	304	78.96	81	21.04
Instruments & Related Products (38)	1,373	-0.05	260	68.24	121	31.76	582	58.67	410	41.33
Transportation& Public Utilities (41, 42, 44–49)	1,198	-0.38	199	68.15	93	31.85	585	64.57	321	35.43
Wholesale & Retail Trade (50–59)	2,113	-0.07	443	72.03	172	27.97	1,091	72.83	407	27.17
Entertainment Services (70, 78, 79)	275	-0.37	47	94.00	3	6.00	149	66.22	76	33.78
Health Services (80)	351	-0.68	38	73.08	13	26.92	147	49.00	153	51.00
Engineering & Management Services (87)	388	-0.47	53	60.23	32	39.77	156	51.15	147	48.85
Other	1,816	-0.22	398	81.10	93	18.90	877	66.14	448	33.86
Total	17,360		3,340	69.77	1,444	30.23	8,006	63.66	4,570	36.34

Table 3. Estimation of Cox proportional hazard model of probability of failure

The table illustrates the estimation of a Cox proportional hazard model of failure probability. Panel A reports the effects of overall CSR score on failure risk, while Panel B reports the effects of each individual CSR dimension: environment, community, human rights, employee relations, diversity and product. *CSR net score* is the net score of CSR rating in the six qualitative issue areas, measured as total strengths minus total concerns; *High CSR* is an indicator variable that equates to 1 if a firm's *CSR net score* is above the sample median value, and 0 otherwise; *EnvHi* is an indicator variable that equates to 1 if a firm's net score of environment rating is greater than median level, and 0 otherwise; *ComHi* is an indicator variable that equates to 1 if a firm's net score of community rating is greater than median level, and 0 otherwise; *HumHi* is an indicator variable that equates to 1 if a firm's net score of human rights rating is greater than median level, and 0 otherwise; *EmpHi* is an indicator variable that equates to 1 if a firm's net score of employee relations rating is greater than median level, and 0 otherwise; *DivHi* is an indicator variable that equates to 1 if a firm's net score of product rating is greater than median level, and 0 otherwise; *ProHi* is an indicator variable that equates to 1 if a firm's net score of diversity rating is greater than median level, and 0 otherwise; *Leverage* is defined as total debts divided by total assets; *ROA* is defined as operating income before depreciation divided by total assets; *Gross margin* is the ratio of gross profit to total sales; *Size* is defined as the natural logarithm of the number of employees; *R&D* is defined as research and development expenses divided by total assets; *M/B* is defined as the market value of equity over book value of equity; *Dividends* is defined as total dividends divided by net income; *Tangibility* is the ratio of gross value of property, plant and equipment to total assets; *BigN* equates to 1 if the firm is audited by a "Big 5" auditor, and 0 otherwise; *Governance* is the net score of governance ratings, calculated as the total strengths minus the total concerns in the governance dimension of KLD rating data. Regressions control for industry and year fixed effects whose coefficients are suppressed. Standard errors are adjusted for heteroskedasticity. The test statistics are included in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A. The effect of CSR activities on firm survival

	(1)		(2)	
	Failure probability	Hazard ratio	Failure probability	Hazard ratio
High CSR	-0.066**	0.935		
	(-2.16)			
CSR net score			-0.019***	0.980
			(-3.08)	
Leverage	0.119**	1.126	0.118**	1.125
	(2.07)		(2.05)	
ROA	-0.174***	0.839	-0.175***	0.839
	(-2.73)		(-2.74)	
Gross margin	-0.005***	0.995	-0.005***	0.995
	(-2.77)		(-2.76)	
Size	-0.016***	0.984	-0.016***	0.984
	(-13.59)		(-13.49)	
R&D	-0.007***	0.992	-0.007***	0.992
	(-3.17)		(-3.15)	
M/B	-0.011***	0.989	-0.011***	0.989
	(-3.59)		(-3.51)	
Dividends	-0.331***	0.718	-0.329***	0.719
	(-7.89)		(-7.87)	
Tangibility	-0.153***	0.858	-0.153***	0.857
	(-3.52)		(-3.53)	
BigN	-0.073*	0.929	-0.070*	0.932
	(-1.75)		(-1.68)	
Governance	-0.014	0.986	-0.011	0.989
	(-0.70)		(-0.55)	
Industry FE	Y		Y	
Year FE	Y		Y	
Chi-squared	878.57		887.49	
Chi-squared test probability	0.0000		0.0000	
Observations	17,360		17,360	

(continued)

Table 3 (continued)

Panel B. The effect of the individual CSR dimensions on firm survival

	(1)		(2)		(3)	
	Failure probability	Hazard ratio	Failure probability	Hazard ratio	Failure probability	Hazard ratio
EnvHi	-0.267***	0.765				
	(-4.92)					
ComHi			-0.198***	0.820		
			(-3.12)			
HumHi					-0.066	0.936
					(-0.36)	
Leverage	0.124**	1.131	0.126**	1.133	0.122**	1.130
	(2.16)		(2.19)		(2.13)	
ROA	-0.174***	0.839	-0.174***	0.839	-0.176***	0.838
	(-2.73)		(-2.73)		(-2.75)	
Gross margin	-0.005***	0.995	-0.005***	0.995	-0.005***	0.995
	(-2.75)		(-2.77)		(-2.80)	
Size	-0.015***	0.984	-0.015***	0.984	-0.016***	0.984
	(-13.22)		(-13.15)		(-13.82)	
R&D	-0.007***	0.992	-0.007***	0.992	-0.007***	0.992
	(-3.14)		(-3.15)		(-3.18)	
M/B	-0.011***	0.989	-0.011***	0.989	-0.011***	0.989
	(-3.66)		(-3.57)		(-3.66)	
Dividends	-0.327***	0.721	-0.329***	0.719	-0.334***	0.715
	(-7.84)		(-7.88)		(-7.98)	
Tangibility	-0.146***	0.864	-0.152***	0.858	-0.150***	0.860
	(-3.36)		(-3.51)		(-3.45)	
BigN	-0.069*	0.933	-0.073*	0.929	-0.079*	0.924
	(-1.65)		(-1.75)		(-1.89)	
Governance	-0.008	0.992	-0.010	0.990	-0.011	0.989
	(-0.39)		(-0.49)		(-0.54)	
Industry FE	Y		Y		Y	
Year FE	Y		Y		Y	
Chi-squared	903.11		879.08		865.75	
Chi-squared test probability	0.0000		0.0000		0.0000	
Observations	17,360		17,360		17,360	

	(4)		(5)		(6)	
	Failure probability	Hazard ratio	Failure probability	Hazard ratio	Failure probability	Hazard ratio
EmpHi	-0.125***	0.882				
	(-3.12)					
DivHi			0.018	1.017		
			(0.56)			
ProHi					-0.137**	0.872
					(-2.15)	
Leverage	0.118**	1.124	0.122**	1.129	0.123**	1.130
	(2.04)		(2.12)		(2.14)	
ROA	-0.175***	0.839	-0.176***	0.838	-0.176***	0.838
	(-2.74)		(-2.75)		(-2.75)	
Gross margin	-0.005***	0.995	-0.005***	0.995	-0.005***	0.995
	(-2.76)		(-2.78)		(-2.78)	
Size	-0.016***	0.984	-0.016***	0.983	-0.016***	0.984
	(-13.67)		(-13.64)		(-13.77)	
R&D	-0.007***	0.993	-0.007***	0.992	-0.007***	0.992
	(-3.15)		(-3.16)		(-3.17)	

(continued)

Table 3 (continued)

	(4)		(5)		(6)	
	Failure probability	Hazard ratio	Failure probability	Hazard ratio	Failure probability	Hazard ratio
M/B	-0.011***	0.989	-0.011***	0.989	-0.011***	0.989
	(-3.57)		(-3.67)		(-3.55)	
Dividends	-0.329***	0.719	-0.335***	0.715	-0.334***	0.715
	(-7.86)		(-7.99)		(-7.99)	
Tangibility	-0.148***	0.862	-0.149***	0.861	-0.148***	0.862
	(-3.43)		(-3.41)		(-3.41)	
BigN	-0.071*	0.931	-0.080*	0.922	-0.078*	0.924
	(-1.69)		(-1.92)		(-1.87)	
Governance	-0.014	0.985	-0.010	0.990	-0.011	0.989
	(-0.73)		(-0.50)		(-0.56)	
Industry FE	Y		Y		Y	
Year FE	Y		Y		Y	
Chi-squared	888.71		864.00		868.22	
Chi-squared test probability	0.0000		0.0000		0.0000	
Observations	17,360		17,360		17,360	

Table 4. The effect of highly infected regions on the relation between CSR activities and firm survival

The table illustrates the effect of pandemic on both survivability and financial performance of high-CSR firms. Panel A reports the estimation of Cox proportional hazards model for high-CSR firms during high infection periods. *High infection region* is a dummy variable which equates to 1 if a region's annual infection rate is above the median level of all regions. *High CSR* is an indicator variable that equates to 1 if a firm's *CSR net score* is above the sample median value, and 0 otherwise; *Leverage* is defined as total debts divided by total assets; *ROA* is defined as operating income before depreciation divided by total assets; *Gross margin* is the ratio of gross profit to total sales; *Size* is defined as the natural logarithm of the number of employees; *R&D* is defined as research and development expenses divided by total assets; *M/B* is defined as the market value of equity over book value of equity; *Dividends* is defined as total dividends divided by net income; *Tangibility* is the ratio of gross value of property, plant and equipment to total assets; *BigN* equates to 1 if a firm is audited by a "Big 5" auditor, and 0 otherwise; *Governance* is the net score of governance ratings, calculated as the total strengths minus the total concerns in the governance dimension of KLD rating data. Panel B documents the regression results of firm performance measures (ROA and Tobin's q) on CSR during pandemic peak years. *Peak* is a dummy variable which equates to 1 if the sample year is 2003 or 2009, and 0 otherwise. Control variables are the same as in Table 3 in all regressions and results are not reported to save space. Panel C presents the effects of CSR on regional pandemic infection rate. The dependent variable is the HHS regional infection rate. The independent variables are: (1) median CSR score in each region; and (2) log value of number of firms that are classified as high-CSR firms in each region. We also include the following control variables: government expense on social welfare per capita, mean temperature, minimum wage, and percentage of population that receive SNAP benefits, results are not reported to save space. Regressions control for industry, region and year fixed effects whose coefficients are suppressed. Standard errors are adjusted for heteroskedasticity. The test statistics are included in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A. The effect of CSR on firm survival in high infection regions

	(1)	(2)
	Failure probability	Hazard ratio
High CSR	-0.067**	0.935
	(-2.34)	
High infection region	0.017	1.017
	(0.42)	
High CSR*High infection region	-0.106**	0.899
	(-2.37)	
Leverage	0.349***	1.418
	(5.94)	
ROA	-0.106*	0.899
	(-1.78)	
Gross margin	-0.005***	0.995
	(-2.84)	
Size	-0.015***	0.985
	(-13.30)	
R&D	-0.008***	0.992
	(-3.16)	
M/B	-0.009***	0.991
	(-3.02)	
Dividends	-0.253***	0.776
	(-6.00)	
Tangibility	-0.040	0.961
	(-0.89)	
BigN	-0.104**	0.902
	(-2.44)	
Governance	-0.000	0.999
	(-0.02)	
Industry FE	Y	
Year FE	Y	
Region FE	Y	
Chi-squared test probability	0.0000	
Observations	16,919	

(continued)

Table 4 (continued)

Panel B. The effect of CSR activities on firm performance during the SARS and H1N1 pandemic peak years

	(1)	(2)
	ROA	Tobin's q
High CSR	0.012***	0.038***
	(3.15)	(5.24)
Peak year	-0.067***	-0.180***
	(-6.66)	(-5.19)
High CSR*Peak year	0.027***	0.059**
	(2.97)	(2.93)
Control variables	Y	Y
Industry FE	Y	Y
Year FE	Y	Y
Region FE	Y	Y
R-squared	0.089	0.375
Observations	16,919	15,678

Panel C. The effect of CSR activities on local infection rate

	(1)	(2)	(3)	(4)
	Infection (*t*+1)	Infection (*t*+2)	Infection (*t*+1)	Infection (*t*+2)
CSR score	-0.027***	-0.006***		
	(-28.46)	(-7.34)		
No. of high-CSR firms			-0.043***	-0.019***
			(-17.62)	(-7.56)
Control variables	Y	Y	Y	Y
Region FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Adjusted R^2	0.828	0.807	0.820	0.808
Observations	14,034	11,993	14,034	11,993

Table 5. The effect of climate change and CSR activities on firm survival

The table illustrates the effect of CO_2 emission and temperature change on both survivability and financial performance of high-CSR firms. Panel A reports the estimation of a Cox proportional hazards model. *Low CO2 state* is an indicator variable that equates to 1 if per-capita CO_2 emissions in the state where the firm is located are lower than the median level. *Tempchange* is defined as the absolute value of mean temperature anomaly in the state where the firm is located compared to its mean value for the 20 years prior to the sample period. Panel B documents the regression results for the performance of high-CSR firms. Control variables are the same as in Table 3 in all regressions and results are not reported to save space. Regressions control for industry and year fixed effects whose coefficients are suppressed. Standard errors are adjusted for heteroskedasticity. The test statistics are included in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A. The effect of climate change and CSR activities on firm survival

	(1)		(2)	
	Failure probability	Hazard ratio	Failure probability	Hazard ratio
High CSR	-0.072**	0.930	-0.067**	0.934
	(-2.50)		(-1.99)	
Low CO2 state	0.212***	1.235		
	(6.85)			
High CSR*Low CO2 state	-0.164***	0.848		
	(-3.76)			
Tempchange			0.011	1.011
			(0.41)	
High CSR*Tempchange			-0.042*	0.959
			(-1.86)	
Control variables	Y		Y	
Industry FE	Y		Y	
Year FE	Y		Y	
Chi-squared test probability	0.0000		0.0000	
Observations	16,918		16,839	

Panel B. The effect of climate change and CSR activities on firm financial performance

	(1)	(2)	(3)	(4)
	ROA	Tobin's q	ROA	Tobin's q
High CSR	0.010***	0.027***	0.006*	0.042***
	(2.74)	(3.47)	(1.67)	(4.71)
Low CO2 state	-0.056***	0.057***		
	(-11.64)	(6.47)		
High CSR*Low CO2 state	0.034***	0.040***		
	(5.09)	(3.18)		
Tempchange			-0.005*	-0.007
			(-1.74)	(-1.04)
High CSR*Tempchange			0.014***	0.014**
			(5.68)	(2.56)
Control variables	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
R-squared	0.086	0.359	0.096	0.369
Observations	16,918	15,681	16,839	15,620

Table 6. Two-stage instrumental variable approach on the effect of CSR activities on firm survival

The table presents coefficients estimated in two-stage IV probit firm survival model. In the first stage, *State divorce rate*, *PDSI* and *Infection rate* are used as instruments. *State divorce rate* is defined as the annual divorce rate in the state where the firm is headquartered. *PDSI* (Palmer Drought Severity Index) measures long-term droughts from a combination of precipitation, temperature, and soil moisture data. *Infection rate* is defined as the number of cases divided by total specimens in each HHS region. Control variables are the same as in Table 3 in all regressions and results are not reported to save space. Our dependent variable in the second stage is *Firm delist*, which equates to 1 if a firm fails to survive to the end of 2018, and 0 otherwise. Regressions control for industry and year fixed effects whose coefficients are suppressed. Standard errors are adjusted for heteroskedasticity. The test statistics are included in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A. First stage: CSR activity is the dependent variable		
	CSR net score	High CSR
State divorce rate	-0.191***	-0.057***
	(-8.13)	(-3.81)
PDSI	-0.042***	-0.022***
	(-3.52)	(-3.22)
Infection rate	1.085***	0.548***
	(3.78)	(3.03)
Control variables	Y	Y
Industry FE	Y	Y
Year FE	Y	Y
F-statistic	14.027***	9.638***
Observations	12,783	12,783

Panel B. Second stage: Firm delist is the dependent variable		
	(1)	(2)
	Delist	Delist
CSR net score	-0.166**	
	(-2.39)	
High CSR		-1.195***
		(-9.20)
Leverage	0.265***	0.267***
	(4.67)	(5.05)
ROA	-0.410***	-0.369***
	(-4.58)	(-4.13)
Gross margin	-0.002	-0.002
	(-0.75)	(-0.48)
Size	-0.009***	-0.007***
	(-10.27)	(-9.40)
R&D	-0.002	-0.001
	(-0.47)	(-0.15)
M/B	-0.004*	-0.003
	(-1.67)	(-1.06)
Dividends	-0.195***	-0.165***
	(-5.78)	(-5.12)
Tangibility	-0.011	0.023
	(-0.31)	(0.68)
Big N	-0.071*	-0.032
	(-1.91)	(-0.89)
Governance	-0.026	-0.021
	(-1.53)	(-1.34)
Industry FE	Y	Y
Year FE	Y	Y
Hansen J-statistic	3.508 (p-value = 0.173)	2.191 (p-value = 0.335)
Observations	12,783	12,783

Table 7. The Heckman two-step model on the relation between CSR activities and firm survival

The table reports the Heckman two-step estimations. In the first step, the probability of a firm choosing a high-CSR strategy is estimated by probit regression. In addition, to control variables used in the baseline model, we add *Anomaly Palmer Z Index* and *SNAP* as two instruments in the first stage. *Anomaly Palmer Index* measures state drought conditions compared to their average level for the 20 years prior to the sample period. *SNAP* is defined as the percentage of a state's population in the Supplemental Nutrition Assistance Program. *Leverage* is defined as total debts divided by total assets; *ROA* is defined as operating income before depreciation divided by total assets; *Gross margin* is the ratio of gross profit to total sales; *Size* is defined as the natural logarithm of the number of employees; *R&D* is defined as research and development expenses divided by total assets; *M/B* is defined as the market value of equity over book value of equity; *Dividends* is defined as total dividends divided by net income; *Tangibility* is the ratio of gross value of property, plant and equipment to total assets; *BigN* equates to 1 if the firm is audited by a "Big 5" auditor, and 0 otherwise; *Governance* is the net score of governance ratings, calculated as the total strengths minus the total concerns in the governance dimension of KLD rating data. Regressions control for industry and year fixed effects whose coefficients are suppressed. Standard errors are adjusted for heteroskedasticity. The test statistics are included in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	First step	**Second step (Cox)**	
	High CSR	Failure probability	Hazard Ratio
High CSR		-0.068***	0.934
		(-2.98)	
Leverage	0.051	0.323***	1.382
	(0.95)	(4.39)	
ROA	0.623***	-0.403***	0.669
	(6.86)	(-11.73)	
Gross margin	0.007*	-0.006**	0.994
	(1.70)	(-2.53)	
Size	0.007***	-0.015***	0.985
	(17.51)	(-25.40)	
R&D	0.008*	-0.008**	0.992
	(1.75)	(-2.57)	
M/B	0.012***	-0.009***	0.990
	(4.12)	(-3.19)	
Dividends	0.135***	-0.302***	0.739
	(4.51)	(-8.53)	
Tangibility	-0.074**	0.044	1.045
	(-1.96)	(1.02)	
BigN	0.516***	-0.152**	0.859
	(10.95)	(-2.47)	
Governance	0.007	-0.016	0.984
	(0.37)	(-0.73)	
Anomaly Palmer Index	-0.027**		
	(-1.98)		
SNAP	-2.321***		
	(-5.10)		
IMR		-0.731**	0.482
		(-2.31)	
Industry FE	Y	Y	
Year FE	Y	Y	
Pseudo R^2	0.081		
P-value of Hansen J-statistic	0.8477		
Chi-squared		960.24	
Observations	13,946	13,946	

Table 8. The effect of industry competition, managerial entrenchment and institutional ownership on firm delisting risk

The table illustrates the effects of industry competition, managerial entrenchment and institutional ownership on firm delisting risk using Cox proportional hazards model. *HHI* is the industry Herfindahl–Hirschman index; E-index measures managerial entrenchment and equates to the sum of six dummies reflecting the following anti-takeover provision: (1) a staggered board, (2) limits to amend the charter, (3) limits to amend bylaws, (4) supermajority voting requirements, (5) golden parachutes for executives, and (6) the ability to adopt a poison pill; *IO* is defined as the percentage of stocks held by all institutional shareholders. *Leverage* is defined as total debts divided by total assets; *ROA* is defined as operating income before depreciation divided by total assets; *Gross margin* is the ratio of gross profit to total sales; *Size* is defined as the natural logarithm of the number of employees; *R&D* is defined as research and development expenses divided by total assets; *M/B* is defined as the market value of equity over book value of equity; *Dividends* is defined as total dividends divided by net income; *Tangibility* is the ratio of gross value of property, plant and equipment to total assets; *BigN* equates to 1 if the firm is audited by a "Big 5" auditor, and 0 otherwise; *Governance* is the net score of governance ratings, calculated as the total strengths minus the total concerns in the governance dimension of KLD rating data. Regressions control for industry and year fixed effects whose coefficients are suppressed. Standard errors are adjusted for heteroskedasticity. The test statistics are included in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)		(3)		(4)		(5)		(6)	
	High HHI		Low HHI		High E-index		Low E-index		High IO		Low IO	
	Failure Prob.	Hazard ratio	Failure Prob.	Hazard ratio	Failure Prob.	Hazard ratio	Failure Prob.	Hazard ratio	Failure Prob.	Hazard ratio	Failure Prob.	Hazard ratio
High CSR	-0.025	0.975	-0.124***	0.883	-0.228***	0.795	0.051	1.052	-0.011	0.989	-0.134***	0.874
	(-0.61)		(-2.60)		(-2.75)		(1.23)		(-0.24)		(-2.84)	
Leverage	-0.033	0.967	0.291***	1.337	0.371*	1.449	-0.145	0.865	0.207**	1.229	-0.015	0.984
	(-0.41)		(3.53)		(1.94)		(-1.55)		(2.22)		(-0.19)	
ROA	-0.170**	0.843	-0.326***	0.721	-0.794**	0.452	-0.469***	0.625	-0.594***	0.551	-0.151**	0.859
	(-2.52)		(-5.05)		(-2.29)		(-5.37)		(-4.69)		(-2.29)	
Gross margin	-0.013**	0.987	-0.003*	0.996	0.073	1.075	0.008	1.007	-0.002**	0.997	-0.010***	0.989
	(-2.40)		(-1.79)		(0.58)		(0.46)		(-2.23)		(-2.74)	
Size	-0.015***	0.985	-0.018***	0.982	-0.009***	0.990	-0.016***	0.984	-0.015***	0.985	-0.020***	0.980
	(-11.16)		(-7.67)		(-4.29)		(-11.39)		(-8.57)		(-9.38)	
R&D	-0.020***	0.980	-0.005**	0.994	0.094	1.098	0.016	1.015	-0.004	0.996	-0.016***	0.984
	(-2.87)		(-2.40)		(0.64)		(0.58)		(-0.89)		(-2.59)	
M/B	-0.011**	0.989	-0.010**	0.989	-0.023**	0.977	-0.020***	0.980	-0.010**	0.989	-0.015***	0.984
	(-2.40)		(-2.53)		(-2.31)		(-3.84)		(-2.18)		(-3.39)	
Dividends	-0.393***	0.675	-0.257***	0.773	-0.483***	0.616	-0.288***	0.749	-0.428***	0.651	-0.239***	0.787
	(-6.76)		(-4.25)		(-5.13)		(-4.71)		(-6.12)		(-4.16)	
Tangibility	-0.031	0.969	-0.242***	0.785	0.028	1.028	-0.137**	0.871	0.014	1.013	-0.311***	0.732
	(-0.53)		(-3.63)		(0.21)		(-2.14)		(0.20)		(-4.81)	
BigN	0.007	1.006	-0.141**	0.868	-0.232	0.793	0.138*	1.148	-0.174**	0.840	-0.038	0.962
	(0.11)		(-2.47)		(-1.40)		(1.84)		(-2.18)		(-0.69)	
Governance	0.001	1.000	-0.025	0.975	-0.104**	0.901	-0.080***	0.923	0.018	1.017	-0.097***	0.907
	(0.04)		(-0.82)		(-1.97)		(-2.93)		(0.59)		(-3.28)	
Industry FE	Y		Y		Y		Y		Y		Y	
Year FE	Y		Y		Y		Y		Y		Y	
Chi-squared	548.22		443.50		280.27		734.43		517.34		551.67	
Chi-squared test probability	0.0000		0.0000		0.0000		0.0000		0.0000		0.0000	
Obs.	8,828		8,532		3,037		8,840		8,106		8,111	

Table 9. **The effect of each of the six CSR dimensions on firm financial performance**

The table presents the regression results of firm financial performance on the six CSR dimensions (Environment, Community, Human rights, Employee relations, Diversity, and Product). The dependent variable used is ROA, defined as operating income before depreciation divided by total assets. *EnvHi* is an indicator variable that equates to 1 if a firm's net score of environment rating is greater than median level, and 0 otherwise; *ComHi* is an indicator variable that equates to 1 if a firm's net score of community rating is greater than median level, and 0 otherwise; *HumHi* is an indicator variable that equates to 1 if a firm's net score of human rights rating is greater than median level, and 0 otherwise; *EmpHi* is an indicator variable that equates to 1 if a firm's net score of employee relations rating is greater than median level, and 0 otherwise; *DivHi* is an indicator variable that equates to 1 if a firm's net score of diversity rating is greater than median level, and 0 otherwise; *ProHi* is an indicator variable that equates to 1 if a firm's net score of product rating is greater than median level, and 0 otherwise; *Leverage* is defined as total debts divided by total assets; *Size* is defined as the natural logarithm of the number of employees; *R&D* is defined as research and development expenses divided by total assets; *M/B* is defined as the market value of equity over book value of equity; *Dividends* is defined as total dividends divided by net income; *Tangibility* is the ratio of gross value of property, plant and equipment to total assets; *BigN* equates to 1 if the firm is audited by a "Big 5" auditor, and 0 otherwise; *Governance* is the net score of governance ratings, calculated as the total strengths minus the total concerns in the governance dimension of KLD rating data. Regressions control for industry and year fixed effects whose coefficients are suppressed. Standard errors are adjusted for heteroskedasticity. The test statistics are included in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Appendix A.

	(1)	(2)	(3)	(4)	(5)	(6)
	ROA	ROA	ROA	ROA	ROA	ROA
EnvHi	0.019***					
	(5.03)					
ComHi		0.027***				
		(3.60)				
HumHi			0.001			
			(0.06)			
EmpHi				0.025***		
				(6.49)		
DivHi					0.015***	
					(3.26)	
ProHi						0.005
						(1.12)
Leverage	-0.116***	-0.116***	-0.115***	-0.115***	-0.116***	-0.115***
	(-10.56)	(-10.79)	(-10.40)	(-10.31)	(-10.63)	(-10.42)
Size	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(4.06)	(4.21)	(4.26)	(4.37)	(4.22)	(4.26)
R&D	-0.090***	-0.090***	-0.090***	-0.090***	-0.090***	-0.090***
	(-19.17)	(-19.30)	(-19.03)	(-19.40)	(-19.27)	(-19.16)
M/B	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***
	(3.55)	(3.46)	(3.57)	(3.51)	(3.44)	(3.53)
Dividends	0.041***	0.041***	0.042***	0.041***	0.042***	0.042***
	(8.51)	(8.87)	(8.59)	(8.64)	(8.73)	(8.56)
Tangibility	-0.014	-0.013	-0.014	-0.014	-0.013	-0.014
	(-1.58)	(-1.49)	(-1.54)	(-1.55)	(-1.45)	(-1.54)
BigN	0.012***	0.012***	0.013***	0.011***	0.012***	0.013***
	(3.99)	(3.69)	(4.15)	(3.73)	(3.89)	(4.24)
Governance	-0.002	-0.002	-0.002	-0.001	-0.001	-0.002
	(-1.14)	(-1.19)	(-0.80)	(-0.60)	(-0.58)	(-0.81)
Industry FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
R-squared	0.353	0.354	0.352	0.355	0.353	0.352
Observations	17,360	17,360	17,360	17,360	17,360	17,360

Table 10. The relation between CSR activities, access to finance and firm survival

Panel A displays the effects of CSR on firm access to finance using ordinary least squares (OLS) regressions. The dependent variables are *KZ index*, *SA index* and *WW index*. Panel B illustrates the estimation of Cox proportional hazards model of probability of failure after controlling for firm capital constraints. Control variables are the same as in Table 3 in all regressions and results are not reported to save space. Regressions include industry and year fixed effects. The test statistics are in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level respectively. All variables are defined in Appendix A.

Panel A. The effect of CSR activities on firm access to finance

	(1)		(2)		(3)	
	KZ index		SA index		WW index	
High CSR	-0.099***		-0.071***		-0.017**	
	(-2.76)		(-5.83)		(-2.18)	
CSR net score		-0.017**		-0.012***		-0.006***
		(-2.68)		(-5.31)		(-6.08)
Control variables	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
R-squared	0.320	0.320	0.341	0.337	0.553	0.557
Observations	14,327	14,327	14,476	14,476	17,220	17,220

Panel B. The effect of access to finance on firm survival

	(1)		(2)		(3)	
	Failure probability		Failure probability		Failure probability	
High CSR	-0.038		-0.021		-0.041	
	(-1.12)		(-0.69)		(-1.31)	
CSR net score		-0.016**		-0.011*		-0.015**
		(-2.31)		(-1.72)		(-2.30)
KZ index	0.021	0.020				
	(1.22)	(1.20)				
SA index			0.706***	0.702***		
			(13.47)	(13.42)		
WW index					1.004***	0.997***
					(6.15)	(6.12)
Control variables	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Chi-squared	820.21	831.02	1287.18	1293.32	979.24	987.45
Chi-squared test probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Observations	14,327	14,327	14,419	14,419	17,220	17,220

Table 11. The relation between CSR activities, CEO turnover and firm survival

Panel A displays the effects of firms' CSR on CEO turnover when firm performance is poor. The dependent variable is *CEO turnover*, which equates to 1 if the firm changes its CEO in a specific year, and 0 otherwise. Control variables include *Leverage, M/B, Size, Firm age, CEO age, CEO gender*, and *CEO tenure. Poor performance* is a dummy variable which equates to 1 if the firm's ROA is lower than the industry median level, and 0 otherwise. *Leverage* is defined as total debts divided by total assets; *M/B* is defined as the market value of equity over book value of equity; *Size* is defined as the natural logarithm of the number of employees; *Firm age* is defined as the total number of months since the firm first appeared in Compustat. *CEO age* is defined as the natural logarithm of CEO age. *CEO gender* is a dummy variable that equates to 1 if the CEO is male, and 0 otherwise. *CEO tenure* is defined as the natural logarithm of number of years that the CEO is in office. Panel B reports the estimation of Cox proportional hazards model with additional indicator of poor performance and the interaction between poor performance and CEO turnover. Control variables in Panel B are the same as in Table 3 and results are not reported to save space. Regressions control for industry and year fixed effects whose coefficients are suppressed. Standard errors are adjusted for heteroskedasticity. The test statistics are included in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. All variables are defined in Appendix A.

Panel A. The effect of CSR activities and poor performance on CEO turnover

	(1)	(2)
	CEO Turnover	CEO Turnover
Poor performance	0.021***	0.008***
	(3.63)	(3.08)
CSR net score	-0.008	
	(-1.43)	
Poor performance*CSR net score	0.034***	
	(2.98)	
High CSR		-0.011***
		(-6.41)
Poor performance*High CSR		0.032***
		(3.07)
Control variables	Y	Y
Industry FE	Y	Y
Year FE	Y	Y
R-squared	0.100	0.100
Observations	11,556	11,556

Panel B. The effect of CEO turnover on firm survival

	(1)		(2)	
	Failure probability	Hazard ratio	Failure probability	Hazard ratio
High CSR	-0.021	0.979		
	(-0.68)			
CSR net score			-0.009	0.991
			(-1.35)	
Poor performance	0.506***	1.658	0.503***	1.654
	(15.87)		(15.80)	
Poor performance*CEO turnover	-0.415***	0.661	-0.414***	0.661
	(-11.07)		(-11.04)	
Control variables	Y		Y	
Industry FE	Y		Y	
Year FE	Y		Y	
Chi-squared	1339.78		1342.77	
Chi-squared test probability	0.0000		0.0000	
Observations	12,032		12,032	

Table 12. The relation between CSR activities, labor productivity and firm survival

Panel A displays the effects of CSR on firm labor productivity using ordinary least squares (OLS) regressions. *Productivity* is defined as the natural log of the ratio of sales to the number of employees and serves as the dependent variable. Panel B illustrates the estimation of Cox proportional hazards model of probability of failure with and without the proxy for labor productivity. In both panels the control variables are *Gross margin*, *Size*, *R&D*, *M/B*, *Dividends*, *Tangibility*, *BigN*, and *Governance*, which are all defined as in Table 3 and results are not reported to save space. Regressions control for industry and year fixed effects whose coefficients are suppressed. Standard errors are adjusted for heteroskedasticity. The test statistics are included in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A. The effect of CSR on labor productivity

	(1)	(2)
	Labor Productivity	Labor Productivity
High CSR	0.166***	
	(7.20)	
CSR score		0.036***
		(4.07)
Control variables	Y	Y
Industry FE	Y	Y
Year FE	Y	Y
R-squared	0.307	0.309
Observations	17,360	17,360

Panel B. The effect of labor productivity on firm survival

	(1)		(2)	
	Failure probability	Hazard ratio	Failure probability	Hazard ratio
High CSR	-0.060*	0.942		
	(-1.94)			
CSR net score			-0.017***	0.984
			(-2.59)	
Productivity	-0.038**	0.962	-0.033**	0.967
	(-2.32)		(-2.03)	
Control variables	Y		Y	
Industry FE	Y		Y	
Year FE	Y		Y	
Chi-squared	873.29		900.17	
Chi-squared test probability	0.0000		0.0000	
Observations	17,360		17,360	

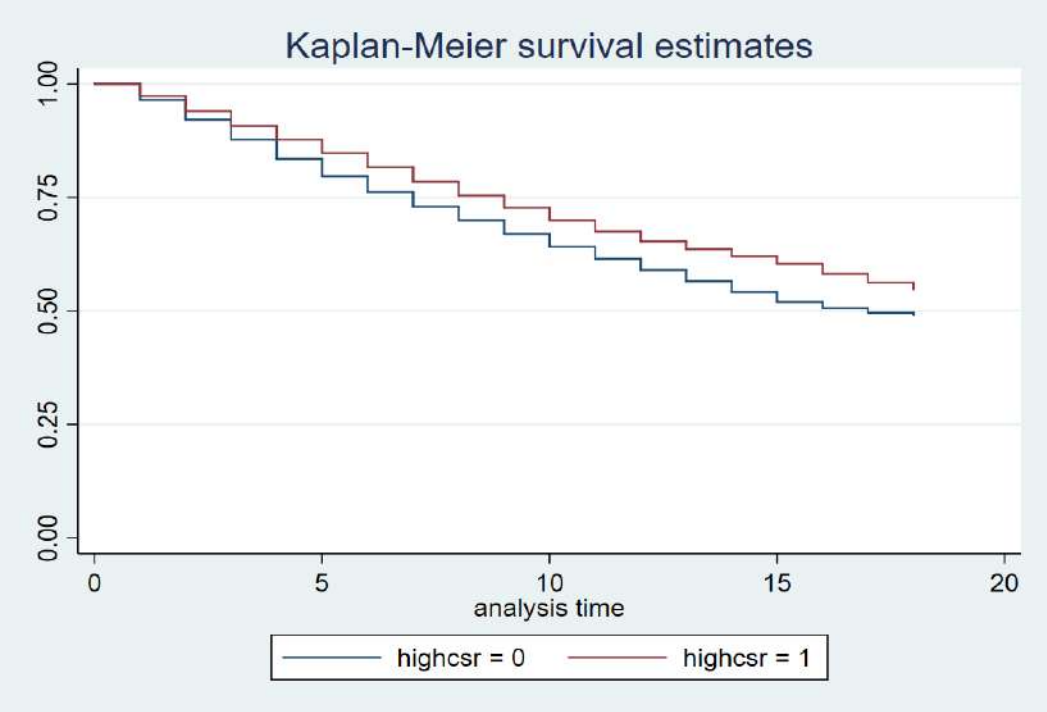

Figure 1. Survival estimates for U.S. firms under the Kaplan–Meier function

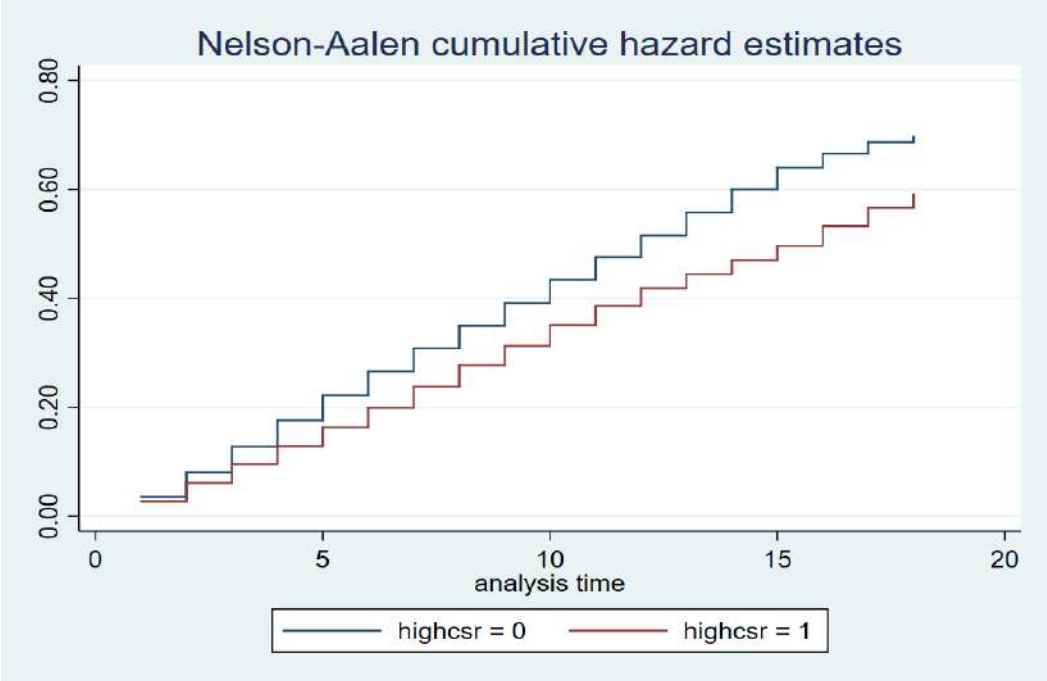

Figure 2. Hazard estimates for U.S. firms under the Nelson–Aalen function

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