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ORIGINAL ARTICLE

The impact of corporate social responsibility on corporate financial performance and credit ratings in Japan

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Abstract
We investigate the impact of companies' sustainability efforts on their corporate financial performance (CFP) and credit ratings in Japan, based on a new proxy for corporate social responsibility (CSR)—Sustainalytics' quantitative Environment, Social and Governance (ESG) ratings. We find weak evidence of a negative impact of ESG scores (on an aggregated basis and disaggregated basis) on several accounting measures of CFP. Our quantile regression results reveal a nonlinear pattern across the quantiles, with CSR effects intensifying at the extremal quantiles. However, we find a weak positive relationship between ESG and stock market-based measures, as well as between ESG and credit ratings. Our findings suggest that investors, credit rating agencies (CRAs) and regulators should differentiate between the three types of ESG screening as they interact and contribute in their specific way to the aggregate ESG effect.

Keywords Corporate social responsibility · Corporate financial performance · Credit ratings · Environment, social and governance ratings · Quantile regression

JEL Classification G39 · Q50 · C21 · C23

Introduction

The subject of Corporate Social Responsibility (CSR) or Environment, Social and Governance (ESG) (both terms are used interchangeably in this paper) has gained increasing prominence in the financial community throughout the world as responsible business models are at the core of the transition to a sustainable global economy. This trend is also present in the Asia-Pacific region, as companies are becoming significantly more ESG responsive (Auer and Schuhmacher 2016).

One of the first studies to offer support for CSR primarily based on stakeholder theory is Freeman (1984), who asserted that a firm's management should formulate corporate policies to satisfy not just shareholders, but also other stakeholders such as customers, employees, suppliers, community groups and governments. In addition to traditional financial measures, stakeholders require that managers also disclose performance in terms of CSR. Numerous corporations around the world have already embedded sustainability principles into their business models, while the world's major exchanges have developed sustainability indexes and set minimum standards for sustainability disclosure as a prerequisite for listing companies on their exchanges. While corporate reputation is the main driver in pursuing sustainability efforts, more and more companies worldwide report their CSR activities, as they are increasingly aware of their additional operational and growth benefits. KPMG (2011) found that in 1996 only 300 firms worldwide produced CSR reports, while by 2014 their number increased to more than 7000 worldwide (Khan et al. 2016).

The interaction between (CSR) and corporate financial performance (CFP) has been extensively examined in numerous theoretical and empirical studies. The findings are still to reach consensus as two contrarian approaches have been put forward. On the one side, Milton Friedman (1970, p. 126) contends that in a free society "there is one and only one social responsibility of business—to use its resources and engage in activities designed to increase its profits so

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long as it stays within the rules of the game, which is to say, engages in open and free competition without deception or fraud." Friedman would view expenditures for CSR as being an illegitimate waste of resources that is in conflict with a firm's responsibility to its shareholders. According to this view, CSR initiatives by corporate management would result in a lower CFP and a lower credit rating and ultimately higher borrowing costs. On the other opposite side, advocates of policies by management directed at CSR (e.g., Barnett and Solomon 2012; Epstein and Rejc-Buhovac 2014) argue that shareholders and creditors will reward the firm with lower funding cost and higher CFP over time.

Given the current global economic agenda, numerous initiatives recommend that institutional investors consider CSR policies in making allocation decisions. For example, in the European Union, the regulatory authorities are considering making it mandatory for institutional investors to include ESG as part of their fiduciary duty. Although in the Asia-Pacific region CSR investing is largely at a nascent stage, CSR is gaining momentum as sovereign and pension funds are increasingly committing to socially responsible investments. Consequently, with the mandatory requirements for institutional investors to include ESG as part of their fiduciary duty, corporate management in the Asia-Pacific region cannot overlook CSR any longer. Investors who do not consider ESG risks in their portfolios may also risk breaching their fiduciary duty (Ottawa 2018).

Credit rating agencies (CRAs) are concerned with ESG issues, which can negatively affect a firm's financial position and leave creditors vulnerable to significant losses (Fitch Ratings 2004). The "Statement on ESG in Credit Risk and Ratings" (Principles for Responsible Investment 2016) calls for CRAs and investors to recognize the importance of considering ESG factors in credit risk analysis and the imperative of making this information transparent.

In this paper, we explore (at both aggregated and disaggregated levels) three ESG aspects for the Japanese market. First, we investigate the impact of CSR (using the Sustainalytics' ESG Rating database) on the Tobin's Q measure. Second, we investigate the impact of CSR on the accounting-based measures of CFP, namely, return on assets (ROA) and return on equity (ROE). Third, we investigate the effects of CSR on credit ratings of Japanese corporations and examine the disaggregated impact of each of the different subscores of ESG on corporate credit ratings.

Following previous indications of a curvilinear CSR–CFP relationship (see Barnett and Solomon 2012), we extend our analysis beyond the ordinary least squares (OLS) regression and try to measure the impact of ESG on different segments of the distribution of the CFP by employing the quantile regression estimation method. Our empirical results provided by the two regression techniques are different with respect to some covariates, suggesting that investors, CRAs and regulators should differentiate between the three types of ESG screening as they interact and contribute in their specific way to the overall ESG effect. The quantile regression analysis provides evidence of a nonlinear CSR–CFP relationship which can be explained by other empirical findings (e.g. Ding et al. 2016) indicating that the relative position of the firm within its specific industry may play an important role in the dynamics of this relationship.

Theory and empirical evidence on the impact of CSR

There are several theories about CSR and its impact on firm valuation based on various metrics of financial performance. On the empirical side, an overwhelming number of studies on the impact of CSR provide mixed evidence leaving the debate unresolved.

Value-Enhancing and agency perspectives: CSR and CFP

There are two general views in the CSR literature, namely the value-enhancing view and the agency view. The CSR value-enhancing view, or the risk mitigation view, asserts that socially responsible firms which help protect the environment, promote social equality and improve community relationships can adhere to value-maximizing corporate governance practices (Ferrell et al. 2016).[1] Several studies link CSR expenditures to future CFP through specific channels such as attracting and retaining high-quality employees, improving the effectiveness of the marketing of products and services, increasing the demand for products and services and providing superior access to valuable resources. Proponents of CSR also identify indirect channels through which CSR expenditures may improve a firm's CFP, including providing a form of reputation insurance and mitigating the likelihood of negative regulatory or legislative action. Still other studies have focused on the individual components of CSR and how they influence borrowing costs and performance.

Benefits of CSR could extend beyond traditional measures of CFP. The recent relevant literature supports a positive stance for CSR. Nguyen et al. (2017) argue that CSR activities can create shareholder value as long as managers are properly monitored by long-term investors who can ensure that managers choose the amount of CSR that maximizes shareholder value. Fatemi et al. (2015) find that

[1] Lys et al. (2015) refer to this as the "investment hypothesis" as current CSR expenditures lead to improvements in future firm performance.

CSR expenditures create value for the firm. Other studies find that voluntary environmental quality is associated with firm value through both the cash flow and the cost of equity components and that ESG strengths increase firm value, while ESG concerns decrease it. In analyzing the impact of the different components of the firm's ESG score, environmental strengths increase the firm's valuation; however, neither social nor governance strengths increase the firm's valuation. Weaknesses in the different components affect (reduce) the firm's valuation in the same way. Klapper and Love (2004) find that better corporate governance is highly correlated with superior operating performance and market valuation for the firms in emerging markets and that firm-level governance is lower in countries with weaker legal systems.

In contrast, the agency view as advocated by Ferrell et al. (2016) generally considers CSR as a managerial agency problem and a waste of corporate resources. Several studies found a mixed or negative relationship between CSR and CFP. According to Bénabou and Tirole (2010) and Cheng et al. (2016), critics of CSR contend that CSR expenditures are an inefficient use of corporate resources and argue that CSR is often a manifestation of managerial agency problems inside the firm. Krüger (2015) argues that socially responsible firms tend to suffer from agency problems as managers engage in CSR that benefits themselves at the expense of shareholders. Moreover, managers engaging in time-consuming CSR activities may lose focus on their core managerial responsibilities (Jensen 2001).

The empirical evidence on the benefits of CSR for US corporations is inconclusive, although predominantly supporting a positive stance on CSR (Margolis et al. 2009). For non-US firms, Xie et al. (2017) find that CSR has no impact on financial performance of firms in China and Vietnam, but that CSR efforts can help companies improve their financial performance only through improving customer satisfaction. Focusing on firms in sensitive industries from BRICS (Brazil, Russia, India, China and South Africa) countries, Garcia et al. (2017) find that the profitability of a firm's assets is negatively associated with only one of the ESG scores, the environmental performance score.

Offering a different perspective, Lys et al. (2015) document that CSR expenditures are not a form of corporate charity, nor do they improve future financial performance. They argue that firms should undertake CSR expenditures only when they anticipate stronger future financial performance and that corporate accountability reporting is another channel through which outsiders may infer insiders' private information about firms' future financial prospects.

Studies investigating the relationship between CSR and CFP generally measure financial performance using either an accounting-based measure of profitability (Aupperle et al. 1985) or a measure of firm stock market performance (Alexander and Buchholz 1978; Vance 1975). For those studies using accounting-based measures, the meta-analysis of Boaventura et al. (2012) revealed that most studies (48%) use return on equity to measure CFP, followed by return on assets (29%). Tobin's Q was used in only 10% of the studies. Studies that use accounting profitability as a measure of CFP find mixed evidence on the link between CSR and CFP, but overall the empirical literature points toward a positive relationship between CSR and CFP (Erhemjamts et al. 2013; Rodgers et al. 2013).

Risk mitigation and agency perspectives: CSR and credit rating

Other ESG-related research addresses the impact of CSR on a firm's costs of financing and stock returns, providing also mixed evidence. During the 2008–2009 financial crisis, Lins et al. (2017) observed that firms with high social capital measured as CSR intensity had stock returns four to seven percentage points higher compared to firms with low social capital. Focusing on responsible practices related to employees, environment and products, El Ghoul et al. (2011) find that responsible US firms experience a lower cost of capital and thus higher valuation. Menz (2010) reports a weak positive relationship between CSR and bond spreads for European firms. Chava (2014) documents that there is an observed positive relationship between expected stock returns and a firms' environmental concerns, and Goss and Roberts (2011) find that firms with below-average environmental and social performance are associated with a higher premium on their cost of private bank debt. In contrast, Sharfman and Fernando (2008) find that firms with good environmental performance have higher leverage and must pay higher bond yields.

At the theoretical level, there are two opposing perspectives regarding the potential impact of CSR initiatives on credit ratings—the risk mitigation (value enhancing) and the agency perspectives. The risk mitigation perspective suggests that CSR activities improve credit ratings. Arguments in favor of CSR center on the negative correlation between CSR and risk. Godfrey (2005) argues that firms with more CSR engagement are exposed to a lower degree of risk. If the investments in CSR lead to lower risk, credit ratings would improve because they provide information about a firm's default probability. Credit rating agencies and debtholders concentrate considerably more on downside risk when reviewing a firm because their payoff on the upside is limited. Consequently, the risk mitigation view suggests that more socially responsible firms are assigned more favorable credit ratings. Empirically, Jiraporn et al. (2014) found that increasing the CSR by one standard deviation results in an improvement of up to 4.5 % in the firm's credit ratings.

On the other hand, the agency view (Jensen and Mecking 1976) argues that CSR investments represent a misallocation of resources, with managers overinvesting in CSR for private benefits instead of maximization of shareholder wealth. It also suggests that by recognizing the agency conflict engendered by CSR efforts, credit rating agencies will assign lower credit ratings to firms with higher CSR. However, the empirical results are mixed. In a recent study, Lioui and Sisto (2017) show that firms highly rated along CSR dimension see their cost of capital increased by 268 basis points.

Datasets

Sample selection

To investigate the relationship between CSR and CFP and between the CSR and credit ratings in Japan, we use data from the following sources: (1) Sustainalytics' ESG Rating database which provides companies' ESG scores based on a range of core and sector-specific indicators; (2) credit ratings from Japan Credit Rating Agency (JCRA) database which provides long-term issuer credit ratings; and (3) Bloomberg database which provides financial statement data.

The Sustainalytics' ESG Rating database covers 530 Japanese companies and provides "overall ESG scores" and component scores of the three pillars, namely E, S and G scores. We filtered this universe to remove banks and financial institutions, as the measures of corporate financial performance (ROA, ROE) and the control variables (for example, leverage, price-to-book ratios, and so on) are not directly comparable between banks and corporations.

For the purpose of this study, two samples are constructed. For the first sample (to study the impact of CSR on CFP), we filter for availability of financial information and Sustainalytics' ESG Ratings, resulting in a reduced sample of 430 firms. For the second sample (to study the impact of CSR on credit ratings), we collect data including credit ratings for 182 firms.

Corporate social responsibility

Constructing a truly comparable and representative measure of CSR has been challenging due to the multidimensionality of the CSR and the limited perspective of the firm's CSR through the measurement of a single dimension (e.g., philanthropy) of CSR (Lydenberg et al. 1986; Wolfe and Aupperle 1991). Waldock and Graves (1997, p. 304) highlighted the "need for a multidimensional measure applied across a wide range of industries and larger samples of companies".

In recent years, most research on CSR relies on the dataset provided by MSCI ESG KLD STATS database; others rely on subjective CSR measures such as a questionnaire, forced-choice survey instruments, reputation index or content analysis. Critiques of MSCI ESG KLD STATS data point out that positive and negative social actions should not be combined as they are both empirically and conceptually distinct components (Mattingly and Berman 2006; Chatterji et al. 2009).

This study aims to provide new insights regarding the effects of CSP on CFP and credit ratings by using the Sustainalytics' ESG Rating for Asia corporates for the measurement of CSR, as it provides a comparable score for each company. The Sustainalytics' ESG Rating dataset has not been widely used in the literature, given the fact that the scores for Asia corporates are available only since 2009. To the best of our knowledge, this study will be one of the first to use the Sustainalytics' ESG Rating dataset to study the impact of CSR.

Sustainalytics is a leading provider of ESG and corporate governance research, ratings and analysis to investors covering 11,000 global companies (1759 Asia companies) across 42 sectors. Overall, Sustainalytics' ESG Rating assesses 150 core and sector-specific indicators with an average of 80 indicators for each company. There are an additional ten indicators for controversial events. Compared to the MSCI ESG KLD STATS[2] database which only expanded its coverage from 2013 to include non-US companies, Sustainalytics' database covers Asia corporates from 2009. An added advantage of Sustainalytics' ESG Rating database over MSCI ESG KLD STATS data is that it allows comparison across multiple peer groups using numerical scores.

The Sustainalytics' ESG Rating dataset not only provides the overall ESG score but also the component scores of the three pillars, namely Environment (E), Social (S) and Governance (G). The Sustainalytics' ESG Rating is a quantitative score on a scale of 1–100 based on a balanced scorecard system. The overall ESG score is computed as a weighted average of the three pillars, with variable weights depending on the peer group. The score of each pillar is, in turn, the weighted sum of the scores on the issues belonging to the respective pillar (see "Appendix A").

For the CSR assessment, fiscal year data are drawn from the Sustainalytics' ESG Rating database for companies from Japan covering the period from the third quarter of 2009 (September 30, 2009) to the second quarter of 2016 (March 31, 2016).

Corporate financial performance

In this study, we employ two accounting metrics, ROA and ROE, as measures of CFP. Extracted both from Bloomberg, ROA and ROE are calculated as the trailing 12 months net

[2] The MSCI ESG STATS database was previously known as the KLD STATS database; the latter covered only US publicly traded companies. MSCI ESG STATS expanded its coverage of non-US companies in 2013.

income divided by the average of the beginning and ending balance of total assets (total common equity) for each financial year, respectively.

We have also considered Tobin's Q (a forward-looking measure of market value) as a proxy for CFP. In contrast to the backward-looking accounting measures, the firm's market value depends on growth prospects, sustainability of profits, or the expected performance in the future (Rust et al. 2004). Market measures are less susceptible to different accounting procedures and represent the investor's evaluation of the ability of a firm to generate future economic earnings (McGuire et al. 1988). Tobin's Q is extracted from Bloomberg, which defines Tobin's Q as the ratio of the market value of a firm to the replacement cost of the firm's assets and calculates this ratio as the sum of market capitalization, total liabilities, preferred equity and minority divided by total assets.

Control variables

There are two different sets of control variables for each sample. These data are extracted from Bloomberg on a fiscal year end basis.

Control variables for sample 1 (to study CSR and CFP)

Size, leverage, cash, price-to-book (PTB) ratio and industry have been suggested in previous research (Ullmann 1985; McWilliams and Siegel 2000; Lys et al. 2015) to be factors that affect a firm's performance and CSR. To isolate the effects of the ESG Total score and component scores on CFP, the following control variables are used: sales[3], cash, leverage, PTB ratio, beta, industry and year.

All the variables (except Industry and Year) have been standardized. Firm size is used as a control variable because larger firms tend to adopt the CSR principles more often (Tsoutsoura 2004). Larger firms also gather more attention and receive more pressure to respond to shareholders' demands (Burke et al. 1986). Sales (as proxy for size) is a relevant variable because there is some evidence that smaller firms may not exhibit as much socially responsible behavior as do larger firms (Waddock and Graves 1997). Larger firms may have greater resources for CSR expenditures and, therefore, may attract greater public pressure to engage in CSR-related activities (Lys et al. 2015; Wu 2006; Teoh et al. 1999). Leverage, measured by long-term debt to total assets, is used as a proxy for risk (Waddock and Graves 1997; Tsoutsoura 2004). The level of management's risk tolerance influences its attitude toward activities that have the potential to elicit savings, incur future/present costs or build/destroy markets. Cash, as a proxy for availability of resources to undertake CSR expenditures, is used as another control variable. Cash is an indicator of firm performance, which some suggest enables or gives rise to the external demand for CSR expenditures (Preston and O'Bannon 1997; Campbell 2007). Price-to-book (PTB) ratio which measures the market value over the book value of a listed company is another control variable. Leverage is also included, as stable firms with lower risk generally appear more likely to make CSR expenditures (Cochran and Wood 1984; Orlitzky and Benjamin 2001).

We control for industry and year fixed effects. Industry is included because the variation in environmental impact, growth prospects, disclosure requirements, and regulatory oversight in different industries is expected to affect the level of CSR expenditures (Karpoff et al. 2005; Griffin and Mahon 1997; Spencer and Taylor 1987). There are 37 industry sectors in the sample, and the segmentation of the industries follows that used in the Sustainalytics' ESG Rating database. Industry is determined in the model by 36 dummy variables. Year is determined in the model by dummy variables from zero to seven to denote each of the fiscal years from 1999 to 2006.

Control variables for Sample 2 (to study CSR and credit ratings)

To isolate the effects of the overall ESG ratings, we consider a set of control variables routinely considered in the relevant credit ratings literature:[4] size, coverage ratio, operating profit margin, leverage ratio, capital intensity ratio and beta.

Firm size is used as a control variable because larger firms tend to garner more attention and receive more pressure to respond to shareholders' demands (Burke et al. 1986). Firm size is shown to be positively related to credit ratings in studies (Bhojraj and Sengupta 2003). Larger firms tend to face comparatively lower business and financial risks and are therefore expected to have lower credit spreads and higher ratings (Oikonomou et al., 2014). The same applies to the coverage ratio and margin variables, as firms that are

[3] Both Sales and Cash (as proxies for size) use the logarithm of total sales, and cash and marketable securities, respectively, and have not been scaled to total assets. This is to isolate the effect of the specific control variable as total assets can be viewed as a measure of size too.

[4] The literature concerning credit ratings has documented many firm characteristics that influence credit ratings. Default risk is found to be inversely related to credit ratings (Lamy and Thompson 1998. Other studies (Blume et al. 1998; Bhojraj and Sengupta 2003; Mansi et al. 2004; Ashbaugh-Skaife et al. 2006) control for a set of variables routinely used in studies of credit ratings to isolate the effects of the CSR variable.

more profitable can afford to be more socially responsible according to the agency perspective.

A higher leverage ratio is associated with higher default risk as firms that accumulate more debt may have more difficulties in servicing that debt. Capital intensity is included to control for differences in companies' asset structures, as companies with greater capital intensity present lower risk to debt providers and thus are expected to have higher credit ratings.

Company credit rating

Given that this study examines only Japanese companies, we used credit ratings from a domestic credit rating agency instead of credit ratings from global credit rating agencies. According to Asian Bankers Association (2000), domestic credit rating agencies have a better understanding and insights of local companies and better access to local information. Credit ratings are extracted from the ratings database of JCRA—the only Japanese rating agency that is officially registered in the USA and certified in the EU, assigning credit ratings to more than 200 foreign issuers, in addition to the domestic issuers in Japan.

Following other studies where commercial credit ratings are used,[5] a measure of a company's credit rating is specified by translating its long-term issuer credit ratings compiled by JCRA to an ordinal scale (from 8 to 1) as follows: AAA and AA+ (8), AA and AA- (7), A, A-, and BBB+ (6) BBB, BBB-, and BB+ (5), BB, BB-, and B+ (4), B and B- (3), CCC (2), and CC and C (1).

Sample Construction

The initial sample is constructed from 530 Japanese corporates covered by Sustainalytics. After accounting for all of the missing information, sample 1 is reduced to an unbalanced panel of 1908 yearly observations from 427 firms across 37 sectors for the period covering fiscal year end 2009 to 2016 (up to fiscal year-end March 2016). "Appendix B" shows the industry breakdown by sample.

The sample is well diversified in terms of industry representation, with a total of 37 industries, where the first three industries (Chemicals, Machinery and Technology Hardware) each represent 7% of the sample. For the second sample (to investigate the relationship between CSR and credit ratings), we further filtered the sample to require firms to have credit ratings. Based on these criteria, the sample is reduced to 182 firms. For each firm, fiscal year-end financial data for the period from 2009 to 2015 are collected. Corresponding credit ratings and ESG scores (with a three-month lag from fiscal year end) are extracted from the JCRA database and Sustainalytics' ESG Rating database, respectively.

After accounting for all of the missing information, sample 2 is reduced to an unbalanced panel of 855 observations from a total of 182 firms across 33 industry sectors for the period covering fiscal year end 2009 to 2015. Based on the industry breakdown in "Appendix B", the firms are well spread over the 33 industries, with only one industry (Transportation) accounting for 12% of the sample. Each of the other industries accounts for less than 10% of the sample. The top five industries (Transportation, Chemicals, Food Products, Utilities and Machinery) represent approximately 42% of the sample. Table 1 provides the descriptive statistics of the dependent and independent

Table 1 Descriptive statistics for regression variables—sample 1

Variable	Mean	SD	Min	Max
Tobin's Q ratio	1.3129	0.8553	0.5989	14.0065
ROA (%)	3.7995	4.6347	− 65.2341	36.2296
ROE (%)	7.1138	13.0174	− 197.3558	131.5627
Sales ($)	3.8298	0.5187	2.1108	5.4266
Leverage	21.8723	17.5416	0	72.7965
Cash ($)	2.9889	0.5015	0.5345	4.6383
Price-to-book ratio	1.5805	1.2921	0.4234	18.2719
Beta	0.7705	2.824	− 23.193	14.627
Overall ESG score	0.5605	0.0787	0.32	0.8
Environment score	0.6009	0.1252	0.26	0.93
Social score	0.5287	0.0909	0.27	0.87
Governance score	0.554	0.0664	0.36	0.84

Note: This table provides the descriptive statistics of the examined variables for 427 Japanese firms during the period 2009 to 2016, based on 1908 observations. Overall ESG score represents Sustainalytics' ESG Rating of a company's overall ESG performance on a scale of 1–100 expressed in percentage.

Table 2 Descriptive statistics for regression variables—Sample 2

Variable	Mean	Median	SD
Rating	6.70	7.00	0.72
Overall ESG score	0.5648	0.56	0.0706
Size	4.04	4.02	0.44
Coverage ratio	77.82	9.95	553
Margin	6.94	5.82	6.44
Leverage ratio	22.28	19.14	15.05
Capital intensity ratio	41.44	36.97	20.63

This table provides the descriptive statistics of the examined variables representing 182 firms during the period 2009 to 2015, based on 855 observations. Rating is the long-term issuer credit ratings compiled by JCRA transformed to an ordinal scale that ranges from 1 to 8. Overall ESG score represents Sustainalytics' ESG Rating of a company's overall ESG performance on a scale of 1–100 expressed as percentage.

[5] See Attig et al. (2013), Blume et al. (1998), Bhojraj and Sengupta (2003), Mansi et al. (2004), and Ashbaugh-Skaife et al. (2006).

variables for Sample 1. The mean Tobin's Q, ROA and ROE are 1.31, 3.80% and 7.11%, respectively. With respect to ESG scores, the sample has a mean overall ESG score of 0.56, while the mean E score, S score and G score are 0.60, 0.53 and 0.55, respectively. These scores are reflective of the CSR awareness and integration within firms in Japan. Table 2 provides summary descriptive statistics for Sample 2. The mean credit rating of the firms in the sample (out of a scale of 1 to 8) is 6.7 and the mean overall ESG score is 0.56.

Methodology

Here are the main hypotheses that will be tested in our paper. Without loss of generality, we denote by SCORE one of the following Sustainalytics' ESG scores: overall ESG, the disaggregated E, the disaggregated S or the disaggregated G.

We test the significance of the relationship between the CSR and CFP based on the following hypothesis:

Hypothesis 1 Firms that implement CSR initiatives as measured by SCORE experience a significant change in their financial performance.

For the relationship between the CSR and credit ratings, we formulate the null hypothesis to test for the positive direction suggested by previous empirical studies:

Hypothesis 2 Firms that implement CSR initiatives as measured by SCORE experience a significant and positive change in their credit rating.

Estimation Models for CFP

First, the relationship between CSR and CFP using both accounting measures (ROA and ROE) and the stock market-based (Tobin's Q) measure is tested using a two-way fixed-effects pooled regression model after controlling for the four key financial variables (in lagged terms as proxies for size, leverage, cash holdings and price-to-book ratio) and Beta. The model specification takes into account both fixed industry and time effects by including 36 and six industry and time dummy variables, respectively. Considering that overall ESG scores may hide confounding effects of the different dimensions of CSR, this study also looks into both the overall ESG scores and the disaggregated ESG scores, namely the E score, S score and G score. For each CFP proxy (Tobin's Q, ROA and ROE) as the dependent variable, we estimate the following model in Eq. (1) using pooled OLS and quantile regression estimation methods:

$$CFP_{it} = \alpha + \beta_1 \mathrm{ESG}_{i,t-1} + \beta_2 \mathrm{Sales}_{i,t-1} + \beta_3 \mathrm{Leverage}_{i,t-1} + \beta_4 \mathrm{Cash}_{i,t-1} + \beta_5 \mathrm{PTB}_{i,t-1} + \beta_6 \mathrm{Beta}_{i,t-1} + \sum_{k=1}^{36} a_k \mathrm{ID}_{ik} + \sum_{j=1}^{6} b_j \mathrm{TD}_{ij} + \varepsilon_{it} \quad (1)$$

where Tobin's Q is the ratio of the market value of a firm to the replacement cost of the firm's assets (extracted from Bloomberg); ROA is Return on Assets (extracted from Bloomberg) computed as the trailing 12 months net income divided by the average of the beginning and ending balance of total assets for each financial year; ROE is Return on Equity (extracted from Bloomberg) computed as the trailing 12 months net income divided by the average of the beginning and ending balance of total common equity for each financial year; ESG is a measure of a firm's sustainability performance based on respective overall ESG, E, S and G scores (extracted from Sustainalytics' ESG Rating database); Sales is the logarithm of total sales in US dollars (US$ millions converted at the prevailing exchange rate at the end of each fiscal year); Cash is the logarithm of cash and marketable securities (millions converted at the prevailing exchange rate at the end of each fiscal year); Leverage is the leverage ratio as measured by the ratio of long-term debt to total assets; price-to-book ratio (PTB ratio) is the ratio of a stock's market value over its book value as at each fiscal year end; Beta is the measure of the firm's systematic risk (extracted from Bloomberg) and is computed based on the regression of the historical trading prices of the stock using weekly data over a two-year period; ID is the respective industry dummy variable which reflects the industry segments provided by Sustainalytics' ESG Rating database, and ID denotes the year dummy variable to reflect the respective fiscal year of the financial data.

We also investigate whether the CFP differs across quantiles of the conditional distribution by employing a quantile regression analysis. We briefly explain the main idea behind the quantile regression model introduced by Koenker and Bassett (1978) as an extension of the conditional mean estimation to prediction of conditional quantile for the dependent variable as functions of the independent variables.

If we denote the dependent variable by Y with its distribution function F_Y and the quantile position by $\tau \in (0, 1)$, then the quantile function for the τ^{th} quantile is defined as $q_Y(\tau) = F_Y^{-1}(\tau) = \inf\{Y : F_Y(Y) \geq \tau\}$. This can be interpreted as following: $100\tau^{th}\%$ of the probability mass of Y is below $q_Y(\tau)$.

Each quantile of the conditional distribution of the response variable is expressed as a function of the observed explanatory variables. Considering the following quantile family $\tau = \{0.1, 0.3, 0.5, 0.7, 0.9\}$, the quantile analysis comprises five regression equations

$$Y_{i\tau} = \alpha_\tau + \sum_j \beta_{j\tau} X_{ij} + \varepsilon_{i\tau}$$

where α_τ and $\beta_{j\tau}$ are estimated by minimizing a special objective function equal to the sum of *asymmetrically* weighted absolute residuals (see Koenker and Hallock 2001) and not by the OLS method. The group of explanatory variables is the same as in Eq. (1).

The quantile regression allows us to measure potentially changing impact levels of the same explanatory variables as in Eq. (1), on different segments of the distribution of the dependent variable. While the OLS regression analysis provides a best-fit methodology for the mean of the dependent variable, the quantile regression provides a best fit for a specific quantile of the distribution around that mean value. By employing the quantile regression, we avoid some of the issues present within standard OLS regression, more specifically the influence of outliers and dependence on assumptions regarding the residuals. We keep the same set of dependent variables as in the pooled regression and the same treatment to the variables by standardizing them.

For the study on CSR, we examine in a first stage the impact of overall ESG score on credit ratings after controlling for the five key financial variables that are known to affect credit ratings. A probit regression model is used given the ordinal (discrete) nature of the dependent variable (Credit Rating) in line with prior research. This regression approach is used to test whether information on CSR activities (measured by overall ESG score), distinct from information considered by rating agencies, can have explanatory power on a company's credit ratings. In a second stage, we extend the analysis by including dummy variables to measure industry and year fixed effects:

$$\begin{aligned}\text{probit}(\text{CR}_{it}) = {} & \alpha + \beta_1 \text{ESG}_{i,t-1} + \beta_2 \text{Size}_{i,t-1} + \beta_3 \text{Coverage}_{i,t-1} + \beta_4 \text{Margin}_{i,t-1} \\ & + \beta_5 \text{Leverage}_{i,t-1} + \beta_6 \text{Capital intensity} + \beta_7 \text{Beta}_{i,t-1} + \\ & + \left[\sum_{k=1}^{32} a_k \text{ID}_{ik} + \sum_{j=1}^{6} b_j \text{TD}_{ij} \right] + \varepsilon_{it}\end{aligned} \tag{2}$$

where *CR* refers to the credit rating of the company, *Size* is the logarithm of total assets in US dollars (millions converted at the prevailing exchange rate at the end of each quarter), *Coverage ratio* is the ratio of earnings before interest and taxes divided by interest expense (EBIT/Interest), *Margin* is the operating profit margin (the ratio of operating income to sales), *Leverage ratio* is the ratio of long-term debt to total assets, *Capital intensity* is the ratio of net fixed assets to total assets and *ESG, Leverage, Beta, ID* and *YD* variables have been previously defined for Eq. (1).

Empirical results

CSR–CFP empirical results

We measure the impact of CSR on three metrics of CFP (Tobin's Q, ROA and ROE) using OLS and quantile regression models. Given that the optimization algorithms involved in the estimation of the two types of regression are different, the estimation results are not directly comparable. However, the new insights provided by the quantile regression are of great value as they suggest relationships of different intensity and sometimes of a different direction between the examined variables, when compared with the results from the pooled OLS regression approach. We collate the results of both types of models in Tables 3, 4 and 5 for Tobin's Q, ROA and ROE, respectively. Each table contains four panels corresponding to the aggregate ESG score and the three individual pillars E, S and G. All the control variables (Sales, Cash, Leverage, PTB ratio, and Beta) were initially included in the OLS regressions to ascertain whether they are potential predictors. The OLS regression results present the estimates of the final specification after the elimination of the insignificant (5%) covariates, such as Cash and/or Sales.

To address year and industry effects, dummy variables are assigned to the different fiscal years (from 2010 to 2016) and the different industry sector (see per industry breakdown in "Appendix B"). The pooled regressions were initially estimated without considering the year and industry effects. With inclusion of year and industry effects, the R-squared generally increased across the different models. The results between the two estimation methods are in general consistent in the case of the two accounting measures ROE and ROA, and less convergent when CFP is measured by Tobin's Q ratio.

For the Tobin's Q measure as the dependent variable (Table 3), the effect of the overall ESG score estimated by the OLS regression is small and positive (0.038) and significant at the 5% level of significance. These findings (positive relationship between ESG and Tobin's Q) are in line with the majority of the literature. The rationale often used in support of CSR improving firm value rests on increased transparency that mitigates information asymmetry between investors and the firm, leading to positive outcomes such as better access to capital.

Table 3 Estimation results CSR–CFP (Tobin's Q) relationship

Regression	Pooled regression	Quantile regression				
Coefficients	OLS	0.1	0.3	0.5	0.7	0.9
Intercept	− 0.038	− 0.340***	− 0.177***	− 0.081***	0.025	0.219***
ESG	0.038**	− 0.007	0.007	− 0.001	− 0.005	− 0.016
Sales	− 0.079***	0.040***	− 0.012	− 0.024***	− 0.038***	− 0.062***
Leverage	− 0.169***	− 0.001	− 0.027***	− 0.039***	− 0.046***	− 0.042**
Cash	–	− 0.019**	0.018**	0.022**	0.035***	0.057***
PTB	0.813***	0.311***	0.528***	0.695***	0.835***	1.144***
Beta	0.089***	0.022**	0.031***	0.040***	0.052***	0.069***
Coefficients	OLS	0.1	0.3	0.5	0.7	0.9
Intercept	− 0.35	− 0.334***	− 0.175***	− 0.081***	0.027	0.216***
E	0.018	− 0.009	0.01	0	− 0.005	− 0.015
Sales	− 0.070***	0.043***	− 0.012	− 0.026***	− 0.039***	− 0.062***
Leverage	− 0.170***	− 0.003	− 0.028***	− 0.039***	− 0.046***	− 0.047***
Cash	–	− 0.021**	0.017**	0.022***	0.036***	0.056***
PTB	0.813***	0.318***	0.531***	0.695***	0.834***	1.13***
Beta	0.900***	0.022**	0.032***	0.040***	0.052***	0.068***
Coefficients	OLS	0.1	0.3	0.5	0.7	0.9
Intercept	− 0.03	− 0.341***	− 0.178***	− 0.080***	0.024	0.218***
S	0.028**	− 0.002	0.005	− 0.002	− 0.005	− 0.011
Sales	− 0.072***	0.038***	− 0.011	− 0.024**	− 0.039***	− 0.059***
Leverage	− 0.168***	− 0.003	− 0.028***	− 0.039***	− 0.045***	− 0.046**
Cash	–	− 0.020**	0.016***	0.021***	0.035***	0.056***
PTB	0.811***	0.315***	0.523***	0.695***	0.836***	1.143***
Beta	0.089***	0.023**	0.032***	0.039***	0.053***	0.068***
Coefficients	OLS	0.1	0.3	0.5	0.7	0.9
Intercept	− 0.002	− 0.337***	− 0.177***	− 0.082***	0.035	0.247***
G	0.042***	0.002	0.003	0.001	0.009	0.006
Sales	− 0.075***	0.038***	− 0.01	− 0.026***	− 0.044***	− 0.062***
Leverage	− 0.170***	− 0.001	− 0.028***	− 0.039***	− 0.044***	− 0.050**
Cash	–	− 0.020**	0.017***	0.023***	0.038***	0.052***
PTB	0.814***	0.315***	0.529***	0.695***	0.831***	1.145***
Beta	0.090***	0.023***	0.032***	0.040***	0.051***	0.069***

The four panels of this table report the OLS pooled and quantile regression results for Tobin's Q (dependent variable) on overall ESG score and the three individual Pillars (Environment Score, Social Score and Governance Score) for Japan (***$p < 0.01$; ** $p < 0.05$; * $p < 0.10$).

The evidence provided by the quantile regression indicates that the coefficients are very small and statistically insignificant across all quantiles.

When we disentangle the overall ESG score into its three individual components E, S and G, the main driving factors suggested by the OLS estimation are G and S, while none of them is significant across all quantile levels. Other divergent effects are present for the control variable Cash, as it is insignificant according to the OLS estimation, but with a clear trend from negative to positive effect across the quantiles in all regressions. The effects of other three control variables are consistent between the two estimation methods, being significant and positive for PTB and Beta, and negative for Leverage. Moreover, the quantile analysis reveals a positive trend in magnitude, as the impact of these three variables on Tobin's Q ratio intensifies as we move towards a higher quantile. Therefore, for the Tobin's Q case based on the OLS regression results, we accept Hypothesis 1 for ESG, S, and G pillars while we reject this hypothesis for the Environment pillar of the ESG. This confirms previous findings (see Bouslah et al. 2010) on the environmental performance suggesting that financial markets have not yet priced in the benefits of such practices. The quantile analysis rejects all

Table 4 Estimation Results CSR–CFP (ROA) Relationship

Regression	Pooled regression	Quantile regression				
Coefficients	OLS	0.1	0.3	0.5	0.7	0.9
Intercept	0.154*	− 0.637***	− 0.202***	0.036	0.236***	0.607***
ESG	− 0.045**	− 0.046	0.004	0.005	− 0.031*	− 0.108***
Sales	− 0.079***	− 0.051	− 0.095***	− 0.074***	− 0.065***	− 0.04
Leverage	− 0.364***	− 0.196***	− 0.224***	− 0.245***	− 0.249***	− 0.267***
Cash	–	− 0.075*	0.012	0.049***	0.075***	0.065***
PTB	0.444***	0.249***	0.392***	0.523***	0.616***	0.824***
Beta	0.055***	0.053*	0.021	0.029**	0.033**	0.044***
Coefficients	OLS	0.1	0.3	0.5	0.7	0.9
Intercept	0.175**	− 0.664***	− 0.201***	0.033	0.249***	0.649***
E	− 0.057**	− 0.003	0.01	0.008	− 0.029	− 0.063*
Sales	− 0.077***	− 0.062*	− 0.099***	− 0.073***	− 0.064***	− 0.054*
Leverage	− 0.362***	− 0.217***	− 0.223***	− 0.245***	− 0.253***	− 0.274***
Cash	–	− 0.102***	0.014	0.045**	0.076***	0.078***
PTB	0.442***	0.248***	0.392***	0.523***	0.607***	0.870***
Beta	0.055***	0.051*	0.021	0.028**	0.030**	0.047***
Coefficients	OLS	0.1	0.3	0.5	0.7	0.9
Intercept	0.146*	− 0.690***	− 0.198***	0.038	0.243***	0.635***
S	− 0.040*	− 0.067**	0.004	0.006	− 0.017	− 0.074***
Sales	− 0.086***	− 0.041	− 0.094***	− 0.075***	− 0.074***	− 0.071***
Leverage	− 0.366***	− 0.178***	− 0.224***	− 0.246***	− 0.249***	− 0.258***
Cash	–	− 0.088**	0.009	0.047***	0.074***	0.076***
PTB	0.446***	0.248***	0.392***	0.522***	0.614***	0.843***
Beta	0.056***	0.033	0.021	0.029**	0.036***	0.042***
Coefficients	OLS	0.1	0.3	0.5	0.7	0.9
Intercept	0.143*	− 0.674***	− 0.213***	0.022	0.228***	0.649***
G	0.018	− 0.025	− 0.013	− 0.005	− 0.015	− 0.047**
Sales	− 0.103***	− 0.065*	− 0.086***	− 0.067***	− 0.075***	− 0.076***
Leverage	− 0.364***	− 0.215***	− 0.224***	− 0.248***	− 0.247***	− 0.272***
Cash	–	− 0.091**	0.009	0.047***	0.074***	0.076***
PTB	0.444***	0.246***	0.388***	0.522***	0.609***	0.869***
Beta	0.055***	0.052*	0.022*	0.031**	0.030**	0.048***

Note: The four panels of this table report the OLS pooled and quantile regression results for ROA (dependent variable) on overall ESG score and the three individual pillars (Environment Score, Social Score and Governance Score) for the Japan. Countries (***$p < 0.01$; ** $p < 0.05$; * $p < 0.10$).

four hypotheses, indicating that there is no significant impact of the ESG efforts at both aggregate and individual levels.

When ROA is used as a proxy for CFP, the empirical results from the two types of regression seem to reconcile, but only at the extremal quantiles (see Table 4). The general conclusion is that the overall ESG and individual E and S scores have a negative impact on the ROA measure. The difference between the two regression types concerns the Governance pillar, which is insignificant in the OLS analysis and negative and significant in the quantile regression at the 0.9 quantile. This particular pattern is observed across the quantiles also in the coefficient estimates for the overall ESG and the individual E and G pillars. In other words, companies with the highest ROA seem to be at a financial disadvantage if they try to satisfy the ESG criteria. Moreover, for the Social pillar the observed effect is more complex, exhibiting a nonlinear dependence. More specifically, although like in Barnett and Solomon (2012) we find that the ESG–CFP relationship (through the S pillar) has a U shape, in our study it is an inverse shape as the negative effect intensifies at both extremal quantiles. According to the OLS analysis, among the individual pillars, the Environmental pillar has the most negative impact (− 0.057) which is higher than the aggregate ESG effect (− 0.045). For the quantile analysis, the driving

individual factor is the Social one (− 0.067 at the 0.1 quantile and − 0.074 at the 0.9 quantile). The Leverage and PTB covariates have a consistent positive trend across the quantiles with both negative and positive effects that intensify as the quantile level increases. The results concerning the Cash control variable show an insignificant coefficient in the OLS regression and a significant changing sign from negative to positive in the quantile regression. The results of the quantile regression are more realistic as they correctly identify that companies with an inferior financial performance do not benefit from increasing their cash position, while well-performing firms do. According to both regressions, we accept Hypothesis 1 at the 10% level of significance for the ESG, E and S scores. Hypothesis 1 of a significant relationship between CSP and CFP through the Governance pillar is rejected for the OLS regression, but accepted for the quantile regression at the 0.9 quantile.

When CFP is measured by ROE, the results are similar to those when employing ROA. The evidence presented in Table 5 shows that the OLS regression results are mixed, as the relationship between ROE and CSR is negative and significant (at the 1% level) at the aggregate ESG level and S pillar level, insignificant for the G score and positive and significant for E score. The coefficients for ESG and S scores are about

Table 5 Estimation Results CSR–CFP (ROE) Relationship

Regression	Pooled regression	Quantile regression				
Coefficients	OLS	0.1	0.3	0.5	0.7	0.9
Intercept	0.178*	− 0.422***	− 0.091***	0.100***	0.278***	0.563***
ESG	− 0.097***	− 0.056*	− 0.021**	− 0.019**	− 0.024**	− 0.060***
Sales	–	0.004	0.043***	0.068***	0.087***	0.134***
Leverage	− 0.192***	− 0.157***	− 0.060***	− 0.028***	− 0.001	0.042*
Cash	–	− 0.042	− 0.035**	− 0.022*	− 0.01	− 0.01
PTB	0.227***	0.184***	0.290***	0.386***	0.463***	0.576***
Beta	0.063***	0.024	0.017*	0.026***	0.028***	0.058***
Coefficients	OLS	0.1	0.3	0.5	0.7	0.9
Intercept	0.214**	− 0.392***	− 0.082***	0.111***	0.284***	0.586***
E	0.107***	− 0.029	− 0.014	− 0.014*	− 0.013	− 0.038***
Sales	− 0.103***	− 0.005	0.040***	0.062***	0.083***	0.119***
Leverage	0.188***	− 0.172***	− 0.061***	− 0.032***	− 0.003	0.049**
Cash	–	− 0.037	− 0.035***	− 0.018	− 0.014	− 0.009
PTB	0.222***	0.194***	0.291***	0.378***	0.461***	0.580***
Beta	0.063***	0.033	0.020**	0.028***	0.027***	0.059***
Coefficients	OLS	0.1	0.3	0.5	0.7	0.9
Intercept	0.159	− 0.444***	− 0.099***	0.099***	0.277***	0.538***
S	− 0.086***	− 0.071**	− 0.014	− 0.012	− 0.018*	− 0.049***
Sales	–	0.026	0.035***	0.067***	0.082***	0.132***
Leverage	− 0.199***	− 0.152***	− 0.055***	− 0.028***	0	0.047**
Cash	–	− 0.052	− 0.031**	− 0.024**	− 0.011	− 0.016
PTB	0.234***	0.188***	0.290***	0.384***	0.463***	0.572***
Beta	0.064***	0.014	0.019*	0.028***	0.030***	0.052***
Coefficients	OLS	0.1	0.3	0.5	0.7	0.9
Intercept	0.137	− 0.398***	− 0.078***	0.103***	0.268***	0.540***
G	0.006	− 0.03	− 0.020**	− 0.022***	− 0.023***	− 0.048***
Sales	–	− 0.007	0.037***	0.070***	0.088***	0.115***
Leverage	− 0.204***	− 0.170***	− 0.061***	− 0.036***	− 0.003	0.042*
Cash	− 0.059**	− 0.046	− 0.031**	− 0.025**	− 0.015	0.004
PTB	0.231***	0.195***	0.295***	0.387***	0.461***	0.590***
Beta	0.061***	0.037	0.021**	0.031***	0.028***	0.059***

Note: The four panels of this table report the OLS pooled and quantile regression results for ROE (dependent variable) on overall ESG score and the three individual pillars (Environment Score, Social Score and Governance Score) for the Japan. Countries (***$p < 0.01$; ** $p < 0.05$; * $p < 0.10$).

− 0.1 and are higher than the regression results for ESG and ROA. However, the R-squared values are lower at about 14%.

Moving to the quantile regression, the results are consistent across all four regression models, with a negative and significant impact of all ESG scores, at both aggregate and individual levels. The ESG overall effect and the Governance effect are uniformly spread across the quantiles, while the Environment and Social pillars have a significant impact only at the extremal quantiles, 0.1 and 0.9, respectively. Again, the concave U-shape pattern is clearly present in the Social component, an effect that still exists but diminishes for the overall ESG score. This suggests that we should differentiate between the three types of ESG screening as they interact and contribute in their specific way to the overall ESG effect. With regard to the control variables, Leverage is predominantly negatively correlated with CFP, while for Sales, Beta and Cash holdings, the correlation results produce mixed evidence of significant results. In the case of price-to-book ratios, the relationship with all measures of CFP is positive and significant. For both estimation methods, we accept Hypothesis 1 for ESG, E, and S, whereas the same hypothesis for the G pillar is rejected in the case of the OLS regression but it is accepted based on the quantile regression.

The two regression analyses above present us with various results evidenced by the CSP-CFP literature: negative, positive or no significant relationship. There are several potential reasons for these findings.

First, CSR expenses have the potential to drain the firm's resources and reduce its immediate cash flows and profitability as evidenced by the negative impact on ROA and ROE. Second, this general lack of a significant positive relationship between ESG and CFP possibly occurs because the companies earmark part of their investments for environmental practices, thereby failing to allot them to the companies' profitable activities. This, in turn, could stem from the relatively higher costs of CSR expenditures to comply with government- and nongovernment-imposed corporate ESG disclosures guidelines.

However, the results from the pooled regressions show that there is a gain in firm value as measured by Tobin's Q from CSR efforts (based on overall ESG scores and disaggregated ESG scores). This positive and significant relationship shows that better alignment of corporate strategies with social responsibility initiatives may generate higher levels of firm value observed in the data. Nguyen et al. (2017) also find that positive valuation interaction between CSR and shareholder value is not driven by higher profitability but by lower cash flow risk—via better stakeholders' relations, lower likelihood of legal actions and greater customer loyalty. Moreover, the long-term benefits of CSR efforts (improving probability of survival, lengthening the longevity of its cash flows or lowering its cost of capital) can outweigh the costs and improve market value.

Table 6 Probit Regression results on the effect of overall total score and individual pillar scores on credit ratings

	Overall ESG	E	S	G
Overall ESG score	0.048***	–	–	–
E score	–	0.032***	–	–
S score	–	–	0.020***	–
G score	–	–	–	0.036***
Size	0.607***	0.597***	0.765***	0.771***
Coverage ratio	0.001**	0.001*	0.001**	0.001*
Margin	0.052***	0.050***	0.045***	0.045***
Leverage ratio	− 0.025***	− 0.024**	− 0.029***	− 0.029***
Capital intensity ratio	0.0361***	0.038***	0.035***	0.034***
Beta	0.003	0.002	0.003**	− 0.002
Pseudo-R-squared	7.76%	7.87%	7.05%	7.27%

This table presents results of ordered probit regressions of companies' credit ratings with the Overall ESG scores and individual pillar scores as the target independent variables, respectively. Based on one-tail test, ***, ** and * denote statistical significance at 0.1%, 1% and 5% levels respectively

The lack of a statistically significant relationship could be partially attributable to mandatory regulations in place for ESG so that the market does not reward CSR efforts. According to the Global Guide to Responsible Investment Regulation (PRI 2016) which laid out the Regulation Map Summary, Japan appears to have relatively stringent disclosure guidelines.

Overall, our results illustrate various aspects that call for more in-depth consideration when one explores how CSR initiatives impact a firm's financial performance. The empirical evidence shows that the relationship between CSP and CFP may depend on the proxy we use for CFP. We may invoke here a temporality issue, as market-based measures (Tobin's Q) are long-term metrics, while the accounting measures (ROA and ROE) are short term. We bring new empirical evidence that different estimation methods can yield contradictory conclusions with significant long-term consequences for all the stakeholders. The consistency of the results produced by the quantile regression makes this technique superior to the OLS estimation and allows us to form a conclusion that supports a negative CSR effect on the financial performance of Japanese firms.

CSR-Credit Ratings Empirical Results

The results of the ordered probit regression are presented in Table 6. There are four regression models corresponding to the second hypothesis, where the target covariates are overall ESG, E, S and G scores, respectively.

Table 7 Probit regression results on the effect of overall ESG score and individual scores on credit ratings including Industry and Year Effects

	Overall ESG	E	S	G
Overall ESG score	0.069***	–	–	–
E score	–	0.061***	–	–
S score	–	–	0.010	–
G score	–	–	–	0.053***
Size	1.021***	0.896***	1.335***	1.152***
Coverage ratio	0.000	0.000	0.000	0.000
Margin	0.065***	0.071***	0.054***	0.054***
Leverage ratio	− 0.068***	− 0.065***	− 0.072***	− 0.076***
Capital intensity ratio	0.061***	0.058***	0.058***	0.060***
Beta	0.004	0.000	0.008	0.002
Industry effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Pseudo-R squared	20.45%	21.34%	19.37%	19.99%

This table presents results of ordered probit regressions of companies' credit ratings with the overall ESG scores and Individual pillar scores as the target independent variables and double fixed effects. Based on one-tail test, ***, ** and * denote statistical significance at 1%, 5% and 10% levels, respectively

The results indicate that Hypothesis 2 is supported. The effect of the overall ESG score on credit ratings is positive and statistically significant at the 1% level, which is consistent with most previous studies. The evidence suggests that firms with higher overall ESG scores enjoy better credit ratings. The estimation results also show that the individual E, S and G scores are positively correlated with credit ratings, supporting the risk mitigation view (positive association between CSR activities and credit ratings) over the agency view (negative relationship between CSR activities and credit ratings).

For the control variables, the coefficient for the size variable is positive and significant at the 0.1% level, confirming that larger firms seem to have lower risk of default. Likewise, for the Margin variable, the operating margin is positively correlated with ratings because higher profitability is associated with lower default risk. For the coverage ratio, the correlation is weak—higher interest coverage is positively correlated with ratings only at the 10% level. The estimated coefficient on the Leverage ratio is negative as firms that have higher debt have lower credit ratings or higher default probability. A positive coefficient for Capital Intensity is consistent with expectations that companies with greater capital intensity present lower risk to debt providers, and thus they are expected to have higher credit ratings. For Beta, there are no significant results.

These results support the risk mitigation view and suggest that there is a significant relationship between credit ratings and both overall ESG score (which is an aggregation of different pillars of ESG), as well as scores of the disaggregated pillars of ESG for the Japanese companies in our sample.

Industry and Year Effects

To obtain a further understanding of the relationship between credit ratings and ESG scores, we augment the analysis by considering year effects and industry effects. Dummy variables are assigned to the different fiscal years (from 2009 to 2015) and the different industry sectors (as per industry breakdown in "Appendix B").

Table 7 presents results of probit regressions of companies' credit ratings on the overall ESG scores and individual pillar scores for Hypothesis 2 with the addition of these dummy variables. Compared to the results reported in Table 6, the overall ESG scores as well as the E and G scores are positively correlated with credit ratings, but the effects of the S scores on credit ratings are not statistically significant after taking into account industry and year effects. The positive correlation found between the individual E and G scores and credit ratings in this study survives this robustness check and suggests that heightened efforts on environment and governance issues would have a statistically significant impact on credit ratings. This is particularly pertinent

considering that approximately 36% of the sample is from environmentally sensitive industries (the top four industries in the sample—Transportation, Chemicals, Food Products and Utilities). These results emphasize again the importance of disaggregating the overall ESG scores which may, on an aggregate basis, hide confounding effects among the different pillars of CSR. The coefficients for Size, Margin and Capital Intensity are all positive and significant except for coverage ratio and Beta with no significant results). Conversely, the estimated coefficient on the Leverage ratio remained negative.

With the inclusion of year and industry effects, Hypothesis 2 is supported for ESG, E and G, while it is rejected for the S pillar. The R-squared increased to above 20% compared to the R-squared of the results without taking into account industry and year effects (of about 7%).

The results illustrate that credit ratings have implicitly considered CSR strengths and weaknesses in addition to financial parameters. While firms with more CSR engagement are generally exposed to a lower degree of risk or better credit ratings, these findings isolate the two pillars (E and G) in ESG that impact credit ratings. These results are in line with those of Ashbaugh-Skaife et al. (2006) who present evidence that firms exhibiting stronger corporate governance (with attributes such as higher degree of financial transparency, board independence, board expertise and the like) benefit from higher overall firm credit ratings. Similarly, Ge and Liu (2015) report that bondholders are more likely to use CSR performance information to assess the creditworthiness of issuers with weaker corporate governance and those operating in environmentally sensitive industries.

Conclusions

The OLS estimation results suggest a positive impact of aggregated CSR on CFP (as measured by Tobin's Q), while there is significant evidence of a negative correlation between CSR and CFP (as measured by ROA and ROE). Although the empirical evidence from the quantile regression analysis is in general similar to the OLS results, the negative association is present across all three proxies considered for CFP, including the Tobin's Q measure. These findings support the agency theory that the managers of nonfinancial Japanese companies consider as their main target the maximization of shareholders' wealth, a pattern also prevailing among nonfinancial Chinese companies (see Farag et al. 2015). Moreover, we have identified a pattern of significance, as the negative ESG impact seems to exist and intensify only across the extremal quantiles, especially at the 0.9 percentile level.

These findings support the potentially nonlinear characteristic of the CSR–CFP relationship suggested by Sahut and Pasquini-Descomps (2015). Our analysis across quantiles shows that for Japanese companies with medium financial performance there is no evidence of a significant ESG impact, while companies in a strong and sometimes weak financial position are negatively affected by increasing efforts with respect to ESG practices. At a disaggregated level, the results differ between the two estimation techniques and across the CFP measures. When accounting measures are considered, the quantile analysis indicates that the Social and Governance factors are the main driving factors while the OLS results explain the ESG impact through the environmental factor. However, when the market measure Tobin's Q is employed as a proxy for CFP, the impact of each individual factors is insignificant across all quantiles, while the OLS analysis suggests the Governance factor is significant. The divergence of our results highlights the importance of acknowledging the difference between market and accounting measures, and implicitly their possible differential effect on CFP of a firm.

With respect to firms' credit ratings, the results from the probit model provide evidence of a positive impact of CSR on credit ratings in Japan at the aggregated level; on a disaggregated basis, we observe some divergence among the three pillars as there is a significant and positive effect on credit ratings based on the E and G pillars of CSR, but not the social pillar. Firms with stronger corporate governance and viewed as environmentally friendly are associated with better credit ratings, while the social pillar has less impact in the consideration of creditworthiness of issuers.

Appendix A

See Table 8.

Table 8 The constituents used in calculating the Sustainalytics' individual ESG scores

Environmental	Social	Governance
Operations	Employees	Business Ethics
Supply Chain	Supply Chain	Corporate Governance
Products and Services	Customers	Public Policy
	Community and Philanthropy	

Appendix B

See Table 9.

Table 9 Sample breakdown of number of firms by industry for each sample

	Sample 1	Sample 2
Auto Components	22	9
Automobiles	10	3
Building Products	5	4
Chemicals	30	18
Commercial Services	8	2
Construction and Engineering	12	4
Construction Materials	2	2
Consumer Durables	12	4
Consumer Services	5	3
Containers and Packaging	3	–
Diversified Metals	5	4
Electrical Equipment	9	4
Food Products	24	13
Food Retailers	11	2
Healthcare	12	1
Home Builders	6	2
Household Products	8	–
Industrial Conglomerates	3	2
Machinery	31	11
Media	10	1
Oil and Gas Producers	2	–
Paper and Forestry	2	2
Pharmaceuticals	21	3
Precious Metals	1	–
Real Estate	21	9
Refiners and Pipelines	5	4
Retailing	25	9
Semiconductors	7	4
Software and Services	19	4
Steel	9	6
Technology Hardware	30	9
Telecommunication Services	4	3
Textiles and Apparels	4	1
Traders and Distributors	9	3
Transportation	25	22
Transportation Infrastructure	3	1
Utilities	12	13
	427	182

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