ENVIRONMENTAL, SOCIAL AND GOVERNANCE AND CREDITWORTHINESS: TWO CONTRARY EVIDENCE FROM MAJOR ASIAN MARKETS

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ABSTRACT

Assets managed under sustainable investment criteria have been massively growing during the recent years. Among the criteria, environmental, social and governance (ESG) score leads the group as an important indicator of non-financial quality of a firm, which may reflect value to investors either through higher expected profit or lower risk. In this paper, we focus on the latter by exploring whether ESG score has linkage to the credit rating of firms due to the risk mitigation effect. Ordered logistic regressions are applied on a panel dataset of listed companies in Shanghai Stock Exchange and Tokyo Stock Exchange from 2009 to 2018. The results suggest that only in Japan, having ESG coverage is greatly associated with being awarded higher credit rating. However, only the environmental and governance pillars positively link to the Japanese firms' credit ratings, while the social pillar shows negative correlation. The finding of heterogeneous effects translates to an important implication that investment in ESG should be taken with care as the impact of ESG may depend on different nature or culture of markets.

Keywords: ESG, issuer credit rating, ordered logit, China, Japan

INTRODUCTION

Globally, the sustainable investment criteria have been rapidly gaining attentions from investors and asset managers. Among them, environmental, social and governance (ESG) score stands out as the leading indicator of non-financial quality of a firm, as it encompasses many issues that capture almost all aspects of a company's operation, including carbon emission, pollution, standards relevant to both employees and customers, supply chain management, community relations, corporate governance, transparency and business ethics. According to the Global Sustainable Investment Review (2018), assets managed under the sustainable investment estimated USD30.7 trillion in 2018, a significant growth from within 4-year period as illustrated in Table 1. More remarkably, the comparative study of five economies by the Global Sustainable Investment Review (2018) reveals exceptionally high growth of more than 4,500% within 4-year period in Japan which was therein used as a representative case for Asia. The high growth results in Japan's sustainable investing asset value now exceeding those of Canada, Australia and New Zealand.

Table 1
Global sustainable investing assets from 2014 to 2018 (USD billion)

Region	Assets in 2014	Assets in 2018	Growth in 4 years
Europe	10,775	14,075	31%
United States	6,572	11,995	83%
Canada	729	1,699	133%
Australia/New Zealand	148	734	396%
Japan	45	2,180	4,744%
Total	18,269	30,683	68%

Note: Data from the Global Sustainable Investment Review (2018)

Furthermore, signatory data from the United Nations Principles for Responsible Investment, launched in 2006, also point to a strongly increasing interest in ESG in Asia-Pacific region. Figure 1 shows cumulative signatories from 11 countries in this region. The figure shows that these Asia-Pacific countries had an increasing commitment to ESG principles with 318 outstanding signatories in 2018, starting with just 21 signatories in 2006. As of the year 2018, Australia led the group at 136 signatories, followed by 67 signatories from Japan, 27 from Hong Kong, 26 from New Zealand, 19 from Singapore, and 18 from China. These statistics suggest that there might have been a dramatic change in the perception of investors in Asia toward ESG investing, despite

the previously slow uptake attributed to the region's resource gap, lack of collective effort, and short-termism that tended to prioritise economic growth and focused on short-term returns, compared to Europe and North America (Wyman, 2018).
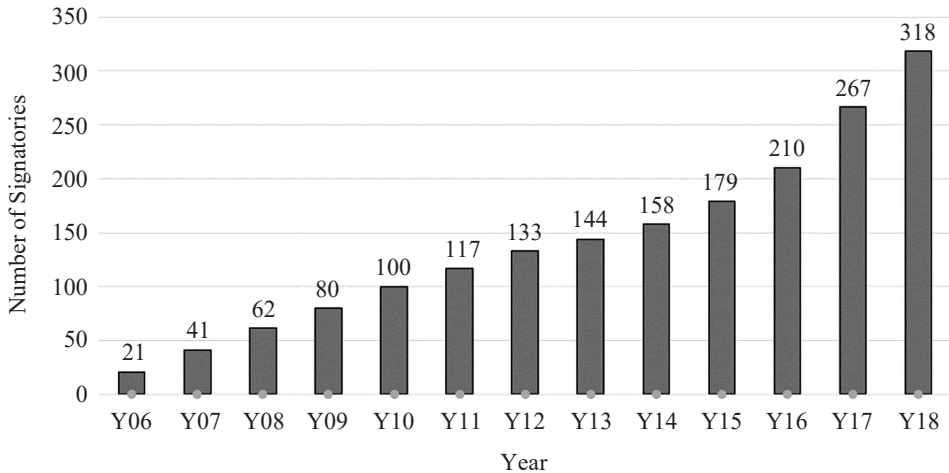

Figure 1. Cumulative signatories from Asia-Pacific countries (Data from the UN's Principle for Responsible Investment 2018)

Besides these numerically stylised facts, the increasing interest toward ESG in Asia has been evidenced in ESG-supportive laws and governmental policies, particularly in Japan and China. In Japan, the country's Financial Service Agency (FSA) officially launched the Japanese Stewardship Code in 2014 (Edahiro, 2014) and The Council of Experts Concerning the Japanese Version of the Stewardship Code (2014), which paved way for corporate reform by encouraging sustainable investing practices. In China, despite the slower effort to incorporate ESG by the private sector, the Chinese government has been publicly pushing for green economic development for several years (Ho & Wang, 2014).

Interestingly, the perception of investors in China and Japan toward ESG investing has been changing against the backdrop of high corporate debt. As illustrated in Figure 2, the data from Bank for International Settlements (BIS) show that China's and Japan's non-financial corporate debts were significantly higher than those of other Asia-Pacific countries, suggesting that there were robust credit markets in these two countries during the period. As ESG becomes on focus of investors with robust credit markets, the primary interesting question is how they go together: whether being covered or receiving better score on ESG

rating enhances firms' overall creditworthiness and whether the impact of ESG on creditworthiness is the same for these two markets. The answer will be helpful for firms deciding whether to invest in the pursuit of ESG disclosure and betterment as well as for investors or credit providers determining whether ESG should be integrated to price credit risk, which is particularly important in the robust credit markets like China and Japan.
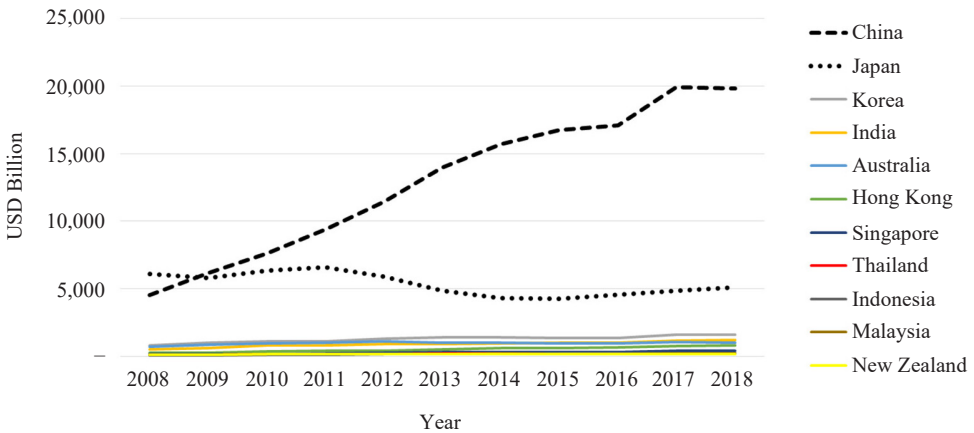

Figure 2. Amount of outstanding debt of non-financial firms in Asia-Pacific region (USD billion) (Data from the Bank for International Settlements (BIS)'s credit to non-financial sector statistics)

Essentially, the ESG score reflects a company's ESG awareness and a balancing act between a company's financial objective and stakeholders' interests. Having a coverage by ESG rating provider also means that a company must disclose adequate extra-financial information for evaluation, which is also beneficial to investors and creditors due to the lesser asymmetric information problem. Possibly, there may be firms with good ESG practice but do not provide enough information for assessment, for instance, because of some burden on administrative processes. However, previous literature argued that firms' decisions to disclose their ESG information could be due to external pressure, either in the form of institutional regulation (Dobers & Halme, 2009; Liu et al., 2010) or in the form of accountability requirements by their business partners (Cheung et al., 2009). Hence, firms failing to disclose adequate information to be assessed by an ESG score provider, regardless of their actual ESG culture, may face relatively higher cost imposed by these external factors, especially in Japan and China where ESG-supportive laws and governmental policies have become more vital (e.g., Edahiro, 2014; Tokyo Stock Exchange, 2018; Luo, 2019; Kuhn, 2019). As firms face higher cost in running business, they may be perceived

by the credit rating provider as riskier. This leads to our hypothesis that companies with ESG coverage should be associated with higher issuer credit rating.

Once a company is covered, based on the stakeholder theory suggested by Freeman (1984; 1994), and Freeman and Evan (1990), the ESG scores may signal how well it can manage its relationship with customers, clients, suppliers, workers and the community, the sources for financial wealth of a company. Firms with good relationship with various stakeholders could be rewarded with better business opportunities and lower business risks. Thereby, a company with better ESG practice should be more desirable for investors and rewarded with lower risk premium. Furthermore, a number of preceding studies in other markets, as will be discussed in the literature review section, provided empirical evidence that better ESG could positively affect firms in terms of lower credit-risk premium and that some banks took into account some risks relevant to ESG matters when managing their overall credit risk. Hence, a company with higher ESG score should have higher credit rating profile.

Notwithstanding the similar background of robust credit markets, increasing interests and awareness in ESG, and being major Asian capital markets,[1] China and Japan are significantly different in many ways. Clearly, the Japanese market is well developed, whereas China is still considered an emerging economy through various qualitative and quantitative measures. At the macro-level, Japan had GDP per capital of USD39,290 in 2018, compared with much lower level of China at USD9,770.20. The higher income level implicitly means more plausible implantation of the culture that assigns greater priority to environmental sustainability which comes at higher cost of living. At the industrial policy level, unlike Japan where the government's subsidies have been more selective, the industrial sectors in China—including utilities, distribution, oil and petrochemical, telecommunication, coal, civil aviation, shipping, machinery, automobiles, and information technology—have been heavily and widely subsidised by the government. Throughout recent history, the Chinese government paid gigantic amount of corporate subsidies to listed companies through tax subsidies, preferential loans, and grants (Capital Trade Incorporated, 2009). These subsidies could have a severe adverse effect on the quality of governance, social condition, and environmental practice in order to support the government's initiatives and policies. Lin et al. (2020) reported that CSR practices of Chinese state-owned enterprises (SOEs) were generally considered burden activities required by the government, which led to inefficient operations. In addition, several studies such as Wu et al. (2012), Ding et al. (2014), and Qu and Ren (2012) provided evidence that political connections played an important role on business success for both

private companies and SOEs, but the success was usually from financial or tax privileges, which were the results of rent-seeking and thinner governance. Nevertheless, the strong support from the government, either through official subsidy programs or privileges from political connections, could be regarded by some investors or credit providers as positive effect on credit risk reduction. Consequently, it is possible that the effect of ESG on creditworthiness of firms is weak in China and different from Japan.

In this paper, we apply ordered logistic regression models with a panel dataset of companies listed on Shanghai and Tokyo Stock Exchange markets to document whether having better ESG can affect creditworthiness of a company. Furthermore, we explore at a more micro level to see the effect of each individual pillar of the ESG, namely, environmental (E), social (S), and governance (G), on credit rating. We find that, only in Japan, having ESG coverage is greatly associated with being awarded higher credit rating. Particularly, the E and G pillars of the ESG score positively link to the credit rating of firms in Japan statistically, while the S pillar has the opposite relationship. In contrast, no linkages of ESG disclosure and betterment on creditworthiness are found in China. This paper, thus, contributes to the ongoing debate regarding the impact of non-financial disclosure and ESG performance on firms' creditworthiness assessment by, firstly, adding evidence in the context of credit-rating of issuers from two major Asian markets, while previous studies largely focused on Western developed markets, and, secondly, pointing out heterogeneous relationships which provide a ground for future study on how market structures could affect the linkages.

LITERATURE REVIEW

There has been a strand of literature studying the effect of ESG on the underlying firms' financial performance, but the findings are still inconclusive. A comprehensive academic survey by Friede et al. (2015) conducted a vote-count tthat combined the findings of 2,200 studies on ESG-corporate financial performance relationship and reported that 90% of the studies found non-negative relationship, where 62.6% of the studies showed positive correlations between ESG factors and financial performance. Similarly, the results of studies based on portfolio analysis of ESG-related strategies are mixed. On the one hand, Busch and Hoffman (2011), Margolis and Walsh (2003), Weber et al. (2008; 2011), and Weber and Ang (2016) documented positive returns on corporate social responsibility and sustainability investments. Statman and Glushkov (2009) also found that firms with high ESG ratings generally provide better returns than

firms with low ratings. On the other hand, alpha studies such as Barnett and Salomon (2006), Bauer et al. (2006), Renneboog et al. (2008), Humphrey et al. (2012), and Auer and Schuhmacher (2016) examined abnormal returns on equity investment strategies based on ESG criteria and found that the effect of ESG portfolio risk-adjusted returns was neutral compared to conventional or passive strategies, due to two natures of the markets. Firstly, information advantage no longer existed as financial markets as a whole typically incorporated ESG criteria relatively quickly. Secondly, ESG alpha was usually wiped out due to fees (Friede et al., 2015; Kolbel & Busch, 2017). Halbritter and Dorfleitner (2015) argued that the magnitudes and directions of the impacts were highly dependent on the ESG rating provider, the company sample, and the particular time interval. Hence, an actual relationship between ESG ratings and financial performance or returns still remains a question.

To gain more insight into the link between ESG and financial performance of firms, it is important to understand mechanisms through which ESG could affect financial performance. A group of research studies argued that firms' decisions to disclose their ESG practice or comply with the standard were due to external pressure, either in the form of institutional regulation (Dobers & Halme, 2009; Liu et al., 2010) or in the form of accountability requirements by their business partners (Cheung et al., 2009). Hence, firms with low ESG standard could face relatively higher cost imposed by these external factors.

Another part of the literature, which also attempted to explain the effect of ESG on financial performance, argued on the basis of the stakeholder theory as initially discussed in Freeman (1984; 1994), and Freeman and Evan (1990). The theory suggests that firms have relationship with different stakeholders in society, including consumers, regulators, and environmental advocates; thus, an increase in ESG spending could improve stakeholder relationship as well as enhance brand and reputation, which in turn reduce the firms' social cost and increase market opportunities and lead to higher net financial performance. Orlitzky and Swanson (2008) investigated corporate social responsibility (CSR) and found that higher CSR spending could raise stakeholders' satisfaction. Similarly, Welford et al. (2008) and Matute-Vallejo et al. (2011) provided supporting evidence for the effect of CSR on relationship with customers or clients. Hart and Ahuja (1996), King (2007), Delmas and Blass (2010), and Qi et al. (2013) studied the environmental component of ESG and found it helpful for enhancing stakeholder relationship. Lastly, Li et al. (2018) focusing on ESG disclosure found that the disclosure helped improve transparency and enhanced stakeholder trust.

The next strand of literature, which is most relevant to the interest of our paper, attempted to explain the link between ESG and firm performance by looking at risk mitigation effect. Arguably, better ESG disclosure or practice could help reduce financial risk implicitly through better accountability and stakeholder management. However, the studies in this strand investigated risk mitigation effect by directly looking at measurements of risk.

Weber et al. (2008) and Weber (2012) argued that environmental risks of borrowers could affect overall credit risk and suggested that lending banks integrate environmental risks into their credit risk management. Weber et al. (2010) constructed a survey database of individual loans' rating based on traditional credit rating, economic sustainability, environmental sustainability, and social sustainability criteria to predict default. The study found that integrating sustainability criteria to the traditional ones significantly improved predictability of default, implying that firms' sustainability practices, including environmental and social matters, could reflect better credit risk management and, thereby, contribute to better performance.

Previous other studies in this area largely employed more objective measurement of risk metrics. First, it appeared in Capelle-Blancard et al. (2019) and Diaye et al. (2017) that countries with above-average ESG performance were associated with lower default risk and lower sovereign bond yield spreads. Stellner et al. (2015) also studied the ESG at the country level but using credit rating as the measure of risk. They found that country-level ESG performance helped moderate the effect of CSR on lowering credit ratings. Lin and Dong (2018) documented that firms with higher prior history of CSR engagement were less likely to file for bankruptcy when they were in deep financial distress but more likely to experience accelerated recovery from disstress. El Ghoul et al. (2011) used several estimates of cost of equity capital as proxies for risk and found that firms with better CSR scores exhibited lower risk. Ge and Liu (2015) also found that better CSR performance was associated with better credit rating, reflecting ex-ante cost of debt, and better CSR performance was linked with lower yield spreads. These results are consistent with the finding of Attig et al. (2013), which employed ordinal regression analysis to examine the effect on issuer credit rating in the same way as our paper does, but on the United States market and with restriction only on CSR. Attig et al. (2013) found that credit rating providers tended to give better rating for firms with good social performance, as CSR performance could convey non-financial information helpful for assessing creditworthiness.

Still, there exists some contrary evidence on the impact of CSR on risk mitigation. Menz (2010) pointed out that better CSR performance of a firm should have contributed to lower risk premium of its debt if risk was lower. However, he found no evidence that CSR was incorporated into the pricing of Euro corporate bonds. In addition, the study of Goss and Roberts (2011) in the United States found that low-quality borrowers that engaged in discretionary CSR spending faced higher loan spreads and shorter maturities, but lenders were indifferent to CSR investments by high-quality borrowers.

Furthermore, the component wise results are still mixed. Some studies document prominent effect of the environmental component. Tang and Zhang (2020) and Zerbib (2019) showed that yield of a green bond was slightly lower than that of a conventional bond, and stock prices positively responded to green bond issuance upon announcement. Eliwa et al. (2021) found that ESG disclosure was a substitute to ESG performance in decreasing firms' cost of debt, and the environmental dimension had the biggest impact on the cost of debt. However, Capelle-Blancard et al. (2019) found that the governance component had much greater impact on sovereign bond yield spreads than social performance and did not find an evidence that environmental performance had significant impact on sovereign bond yield spreads.

DATA AND RESEARCH METHODS

In order to examine the effect of ESG disclosure and performance on creditworthiness, we employ the ordered logistic regression model because the explained variable is of ordinal categories rather than continuous. More precisely, this study uses long-term issuer credit rating as the explained variable, as it represents a forward-looking opinion on overall creditworthiness of a company without specification to any financial obligation or bond issue. The data are drawn from local credit rating agencies specific to each market: Lianhe, Chengxin International and Brilliance for companies from China and Japan Credit Rating Agency (JCR) and Rating and Investment Information (R&I) for those from Japan. We use local rather than standardised global credit rating agencies due to the limitation in global rating coverage in Asia. Anyhow, these are among the best information on credit ratings available to investors and, therefore, should be link to investors' views toward credit risk levels of the firms. We then recode the ratings into ordinal number by assigning value 8 for rating AAA, 7 for AA+, 6 for AA, 5 for AA−, 4 for A+, 3 for A, 2 for A−, and 1 for BBB+ to BBB−, covering the entire investment grade categories. The distributions of the credit ratings in our dataset are tabulated in Table 2.

Table 2
Distributions of issuer credit ratings

Recorded	1	2	3	4	5	6	7	8	Total
Rating	BBB− BBB+	A−	A	A+	AA−	AA	AA+	AAA	
China	23 (3.16)	10 (1.37)	9 (1.23)	14 (1.92)	31 (4.25)	118 (16.19)	159 (21.81)	365 (50.07)	729
Japan	206 (11.20)	276 (15.01)	364 (19.79)	284 (15.44)	314 (17.07)	224 (12.18)	112 (6.09)	59 (3.21)	1,839
Total	232 (9.04)	287 (11.19)	374 (14.57)	300 (11.68)	349 (13.60)	358 (13.95)	293 (11.40)	474 (18.46)	2,568

Notes: Data in brackets are percentage of samples. Data source: Author's calculation.

For the main explanatory variables, we rely on the ESG score reports published on Bloomberg Terminal. Bloomberg has been monitoring public companies' environmental, social and governance (ESG) performance since 2009. The Bloomberg ESG score reports consider the amount of ESG information disclosed by companies and rate them. Companies with insufficient disclosed information are not covered in the reports. Hence, the score serves as an indicator from the perspective of raw data and the amount of disclosure that companies made available on the public domain. We use a dummy variable of whether the Bloomberg ESG score for a company is available to proxy for ESG disclosure. To measure ESG performance, we employ, first, the overall ESG score of a company and, second, each of the main pillar scores: environmental (E), social (S) and governance (G). Bloomberg does not make publicly available the detailed assessment methodology and elements considered under each of the pillars. However, it follows the standard industry practice of ESG ratings, which includes resource use, energy, water, emission, and waste in the environmental ratings, women on the board of directors, workforce accidents, product quality, data privacy, diversity and inclusion, working condition, health and safety of employees, and corporate social responsibility (CSR) programme in the social ratings, and shareholder rights, compensation, and management structure in the governance ratings. The ESG scores and their pillars, if covered in the reports, range from 1, which is the lowest performance, to 100, which means the best. Objectively, the score should reflect internal operation excellence of a company. It shows how well a company can address its ESG concerns through a balancing act between various stakeholders' interests and profits. Hence, a company with stronger ESG profile should be more desirable for investors who can access Bloomberg Terminal at no extra cost. Our study covers a panel of publicly traded companies from Shanghai Shenzhen CSI 300 and

Nikkei 225, starting from the year 2009 in which Bloomberg Terminal launched the ESG score reports until the year 2018. In addition, this paper follows the common practice in mainstream literature by excluding firms in financial sectors to ensure that skewed financial fundamental data of these firms do not drive our results. Financial firms, unlike the other firms, are on the supply side of the financial markets, making their financial structure and risk exposition different. High leverage for a financial firm is normal and typically does not indicate distress as when a non-financial firm experiences high leverage. Hence, credit risk assessment and determination of financial firms could be different from the other firms. Testing with financial firms included could be done in future research. Table 3 illustrates the number of companies in our data set.

Table 3
Number of companies in the dataset

Country	Index	Total public companies	Excluded/not available	Available data	% of available data
China	CSI 300	300	116	134	45
Japan	Nikkei 225	225	41	184	82
Total		525	157	318	61

Note: Author's calculation

In addition, we control for each company's debt-to-total-equity ratio (DE), EBIT-to-total-revenues ratio (*EBITrev*), market capitalisation (*mcap*), total revenues (*rev*), EBITDA, total assets (*asset*) and firm age (*age*), as it has been documented in the mainstream literature that these financial variables could affect a company's credit risk and, thereby, rating. Debt-to-equity ratio is calculated as net debt divided by total equity, where the net debt represents the sum of total debt, minority interest, redeemable and non-redeemable preferred stock, less cash, cash equivalent, and short-term investment. This variable is a control for financing structure of firms. EBIT-to-total-revenue ratio of a firm represents its EBIT divided by the total revenues of the same period. It captures the firms' operating profitability out of their revenues. Market capitalisation is the sum of market values for all relevant issue level share types, based on the latest close price. Total revenues include revenues from all of a company's operating activities after deducting any sales adjustments and their equivalents. EBITDA is earning before interests, taxes, depreciations and amortisation of each company. Total assets measure assets of a company at the end of corresponding fiscal year. The variables *mcap*, *rev*, EBITDA and *asset* are natural log value of market capitalisation, total revenues, EBITDA and total

assets, respectively. They capture financial fundamentals of firms that clearly affect credit rating. Finally, firm age is the number of years a company has been operating since its establishment, which may affect credibility of the firm. All the control variables are retrieved from Thomson Reuters Eikon.

Table 4 provides summary statistics of the variables used in our study. As illustrated in the table, the credit ratings and ESG structure seem to be different in these two countries. Credit ratings are, on average, higher in China as evidenced by the skewed distribution with many firms concentrated in the high region of ratings. Japanese credit ratings also spread out somewhat more as reflected in the higher standard deviation. ESG and the component pillar scores are obviously higher and varied more in Japan. These summary statistics, though rough, suggest possibilities of heterogeneous links between ESG and credit ratings across the two countries. In terms of the controlled factors that may contribute to credit ratings, we observe that Japanese firms are much older. Japan's economy has been long developed with many well-established firms operating in the market, while China is still emerging and has just opened the economy for a few decades. The overall financial fundamentals captured by the other variables are not noticeably far different.

Table 4
Summary statistics of the variables employed in the study

Variable	China					Japan				
	No.	Mean	SD	Min	Max	No.	Mean	SD	Min	Max
Rating	707	6.89	1.64	1.00	8.00	1,697	3.87	1.86	1.00	8.00
ESG	707	22.21	11.43	0.00	54.55	1,697	33.75	16.35	0.00	61.57
E	707	12.33	10.05	0.00	48.06	1,697	32.79	18.77	0.00	78.29
S	707	24.27	15.64	0.00	73.68	1,697	27.88	14.52	0.00	68.42
G	707	42.07	16.91	0.00	62.50	1,697	44.72	18.28	0.00	67.86
DE	707	1.19	1.09	0.00	7.79	1,697	0.89	0.87	0.00	10.58
EBITrev	707	0.12	0.12	−0.36	0.64	1,697	0.07	0.07	−0.51	0.62
mcap	695	8.87	0.97	5.68	12.77	1,696	8.80	1.06	5.76	12.28
rev	707	8.50	1.60	4.44	13.07	1,697	9.27	1.07	6.34	12.53
EBITDA	612	6.43	1.52	1.69	10.91	1,669	7.05	1.11	1.85	10.59
asset	707	9.11	1.42	5.32	12.87	1,697	9.50	1.07	6.99	13.07
age	600	21.92	4.95	10.00	32.00	1,668	80.72	28.66	11.00	139.00

Methodologically, our study is based on the ordered logistic (ologit) regression models with the re-coded ordered credit rating (*CR*) as the dependent variable. More precisely:

Model I:

$$C^* = \gamma_1 Disclosure_{it} + \beta_2 DE_{it} + \beta_3 EBIT_{it} + \beta_4 mcap_{it} + \beta_5 rev_{it}$$
$$+ \beta_6 EBITDA_{it} + \beta_7 asset_{it} + \beta_8 age_{it} + u_{it}$$

Model II:

$$C^* = \gamma_1 ESG_{it} + \beta_2 DE_{it} + \beta_3 EBIT_{it} + \beta_4 mcap_{it} + \beta_5 rev_{it} + \beta_6 EBITDA_{it}$$
$$+ \beta_7 asset_{it} + \beta_8 age_{it} + u_{it}$$

Model III:

$$C^* = \gamma_1 E_{it} + \gamma_2 S_{it} + \gamma_3 G_{it} + \beta_4 DE_{it} + \beta_5 EBIT_{it} + \beta_6 mcap_{it} + \beta_7 rev_{it}$$
$$+ \beta_8 EBITDA_{it} + \beta_9 asset_{it} + \beta_{10} age_{it} + u_{it}$$

Where *C** is the underlying latent variable, and u_{it} is the unobserved disturbance term assumed to follow the Logistic Distribution. The resulting observed value of credit rating is determined by

$$CR_{it} = j \quad \text{if} \quad \alpha_{j-1} < \alpha_j, \quad \text{for} \quad j = 1, 2, 3, \ldots, 8$$

Where $\alpha_0 = -\infty$, $\alpha_8 = \infty$, and the other α parameters are the ordinal cut-off thresholds to be estimated within the model.

Regarding the explanatory variables, *disclosure*$_{it}$ in Model I takes numerical of one when the company *i* at time *t* has Bloomberg ESG score reported; *ESG*$_{it}$ in Model II captures the overall Bloomberg ESG score of the company *i* in period *t*; and *E, S* and *G* in Model III denote the environmental, social and governance pillar scores, respectively. For Models II and III, we first estimate them by using all the companies in the dataset, both with and without ESG scores and, subsequently for robustness check, investigate the sub-sample that includes only the companies with available ESG scores.

From the model specification, we can derive the probability that the predicted credit rating of firm *i* at time *t*, conditional on the explanatory variables, falls in rating category *j* as modelled in the following function:

$$Pr\{CR_{it} = j | X_{it}\} = \frac{exp\{\alpha_j - \beta X_{it}\}}{1 + exp\{\alpha_j - \beta X_{it}\}} - \frac{exp\{\alpha_{j-1} - \beta X_{it}\}}{1 + exp\{\alpha_{j-1} - \beta X_{it}\}}$$

where βX_{it} is our simplified notation for the explanatory part of the model, and exp{.} denotes exponential function. This equation implies the cumulative probability in logit function equal to

$$Pr\{CR_{it} \leq j | X_{it}\} = \frac{exp\{\alpha_j - \beta X_{it}\}}{1 + exp\{\alpha_j - \beta X_{it}\}}$$

and the odds of getting higher credit rating equal to

$$\Omega_j = \frac{Pr\{CR_{it} > j | X_{it}\}}{Pr\{CR_{it} \leq j | X_{it}\}} = exp\{\beta X_{it} - \alpha_j\}$$

When any factor X^k_{it} of the regressors increases by one unit, holding other factors constant, the odds of getting higher credit rating changes relatively by

$$\frac{\Omega_j | X^k_{it} + 1}{\Omega_j | X^k_{it}} = \frac{Pr\{CR_{it} > j | X_{it}\}; X^k_{it} + 1}{Pr\{CR_{it} \leq j | X_{it}; X^k_{it}\}} = exp\{\beta_k\}$$

where β_k is the coefficient of the explanatory variable X^k in the regression model. Therefore, we will mainly look at the exponential of coefficient of each of the interested explanatory variables when discussing the result in the following section.

EMPIRICAL FINDINGS

Table 5 presents the main findings of our study based on the full samples comprising both the companies with and without Bloomberg ESG scores. The column Coefficient shows the ordered logistic estimates of the coefficients γ of each of the models specified in the previous section. The column Odds Ratio provides the exponential values of the estimated γ's, which capture the impact of a unit change in the ESG-related variable on the odds of receiving a better credit rating.

As illustrated in Table 5, the estimates of all the models for China fail to have statistical significance, suggesting that ESG seems to have no link to creditworthiness of the companies listed on Shanghai Shenzhen CSI 300. These results may able to be explained by the nature of many Chinese firms that have political connections, which are beneficial for their performance, as documented in several previous studies such as Wu et al. (2012), Ding et al. (2014), and Qu and Ren (2012). As discussed in Ding et al. (2014), the

resulting better performance of firms with political connections often came through financial or tax privileges, which contradicted with good ESG practice. Moreover, the effects of political privileges, if sufficiently strong, could drive out market competition and make other factors irrelevant to firm performance and rating. Surely, not all the Chinese companies have such political connections and privileges, but the existence of a number of such firms could essentially blur up the effect of other factors, including the ESG disclosure and scores. In addition, Liu and Anbumozhi (2009) and Yu et al. (2006) found that external pressure within China toward firms' ESG disclosure was low, implying low cost of not meeting ESG standard for Chinese firms. Although there has been higher pressure from the government's regulation during the period of our study, the cost may still not be high enough to affect financial risk and performance of Chinese firms from the perspective of credit rating providers. In any case, it is beyond the scope of this paper to justify the reasons; so, we leave it for future researches to explore the underlying reasons the drive our findings herein.

On the contrary, several significant effects are revealed for the companies listed on Japan's Nikkei 225. Naturally therefore, for the two-country pooled sample of companies from China and Japan, estimates are similar to those of Japan, as the results are driven by explanatory power of the Japanese observations.

As showed in Table 6, the result of Model I indicates that availability of Bloomberg ESG score increases the odds of getting better rated by 1.479 times in Japan. A plausible explanation is that Bloomberg ESG coverage may be an indirect result of extra disclosures and sustainable efforts to achieve transparency of a company, which is positively recognised by credit rating agencies in Japan. The argument is in line with Li et al. (2018) that found that ESG disclosure helped improve firms' value through transparency and enhanced stakeholder trust. This result of Japan is also consistent with the finding in Eliwa et al. (2021) that ESG disclosure helped decrease firms' cost of debt, as it may help signal lower credit risk. Consequently, ESG disclosure may help improve the credit rating through risk mitigation as we hypothesised as well. Similarly, the result of Model II suggests that an ESG score improvement, either by starting to have Bloomberg ESG score or receiving higher score, helps increase the odds of having better credit rating in Japan, although the number is small economically. This result contributes to the literature as another evidence for positive effect of ESG on credit risk management or mitigation, consistent with Capelle-Blancard et al. (2019), Diaye et al. (2017), and Weber et al. (2010), for instance. In addition, what we found for Japan herein can help explain the link between ESG and financial performance documented in several previous studies, since better risk management generally results in improved financial performance.

Zooming in to the pillar level, we observe that the positive impact on credit rating comes from the environment and governance pillars. These empirical findings are consistent with Tang and Zhang (2020) and Zerbib (2019), which showed that lenders required relatively lower risk premia for environmentally advocated projects like green bonds, and in line with Capelle-Blancard et al. (2019) that found governance to have an impact on sovereign bond yield spreads. Surprisingly however, our result shows that a better social score contributes to an increase in the odds of getting worse credit rating.

The result of negative effect of the social pillar on credit rating is somewhat puzzling, since it contradicts several prior studies such as Orlitzky and Swanson (2008), Welford (2008), Lin and Dong (2018), El Ghoul et al. (2011), Ge and Liu (2015), and Attig, et al. (2013) that found corporate social performance and spendings helped improve relationship with clients, lower risk of financial distress, and decrease credit risk either measured in terms of cost of capital, yield spread, or credit rating. Nevertheless, social responsibility comes at a cost. Hahn et al. (2010) and Winn et al. (2012) argued that there generally was a trade-off between a company's business objectives and sustainability. In addition, we conject that plausible explanation may be related to Japanese culture and the definition of social responsible component evaluated by Bloomberg ESG reports, which includes job satisfaction, worker rights, diversity, and gender equality. Despite being an advanced economy with a well-developed market, Japan still widely accepts overwork culture, rigid labor market with very high retention rate, workplace bias, and low female workforce participation rate. Such norms may contribute to productivity and overall performance of Japanese companies, hence, viewed as lower default risk and rewarded better creditworthiness by credit rating providers. However, they negatively impact the social pillar score. Certainly, there are other aspects of the social component to which Japanese culture positively impacts. An example is the emphasis on equal wealth distribution, rather than shareholders' profit maximisation, resulting in significant spending on external CSR programmes. Plausibly added explanation may be by Stellner et al. (2015) which employed data from several countries in the Euro zone and found the links between CSR and credit risk to be lower in countries with higher ESG performance. As Japan is one of the countries with high overall ESG performance, it is possible that the link between its good CSR practice and credit risk is low and outweighed by the effect of workforce conditions. We leave it for future research to deeply analyse why credit rating providers in Japan might perceive social responsibility performance to increase credit risk and which elements in the social pillar play more dominant role for the observed outcome.

Table 5
Full-sample estimated coefficient results

Regressors	Model I			Model II			Model III		
	China and Japan	China	Japan	China and Japan	China	Japan	China and Japan	China	Japan
Disclosure	0.465*** (0.129)	0.481 (0.556)	0.391*** (0.137)						
ESG				−0.002 (0.003)	0.003 (0.014)	0.006*** (0.003)			
E							−0.021*** (0.004)	−0.015 (0.021)	0.007* (0.004)
S							−0.005 (0.005)	0.000 (0.012)	−0.015** (0.006)
G							0.024*** (0.004)	0.016 (0.013)	0.011** (0.005)
DE	−0.137** (0.061)	−0.074 (0.129)	−0.961*** (0.087)	−0.124** (0.061)	−0.093 (0.128)	−0.940*** (0.086)	−0.213*** (0.063)	−0.066 (0.130)	−0.928*** (0.888)
EBIT	0.074 (0.989)	6.388*** (2.326)	−5.687*** (1.138)	−0.178 (0.988)	6.484*** (2.343)	−5.837*** (1.139)	−0.301 (0.972)	6.248*** (2.335)	−5.269*** (1.139)
mcap	1.343*** (0.091)	−0.104 (0.242)	1.112*** (0.108)	1.358*** (0.091)	−0.110 (0.247)	1.138*** (0.107)	1.331*** (0.092)	−0.092 (0.247)	1.124*** (0.108)
rev	−0.844*** (0.142)	0.664** (0.330)	−1.232*** (0.173)	−0.847*** (0.142)	0.676** (0.333)	−1.243*** (0.174)	−0.827*** (0.141)	0.664** (0.334)	−1.210*** (0.173)

Table 5 (*continued*)

Regressors	Model I			Model II			Model III		
	China and Japan	China	Japan	China and Japan	China	Japan	China and Japan	China	Japan
EBITDA	0.188	−0.338	1.334***	0.180	−0.346	1.326***	0.267**	−0.320	1.296***
	(0.121)	(0.295)	(0.164)	(0.121)	(0.297)	(0.164)	(0.123)	(0.298)	(0.164)
asset	0.352**	0.833***	0.440**	0.340**	0.841***	0.431**	0.335**	0.821***	0.427**
	(0.141)	(0.274)	(0.179)	(0.141)	(0.278)	(0.179)	(0.141)	(0.278)	(0.179)
age	−0.024***	−0.083***	0.001	−0.0241***	−0.083***	0.000	−0.021***	−0.084***	0.001
	(0.002)	(0.031)	(0.002)	(0.002)	(0.031)	(0.002)	(0.002)	(0.031)	(0.002)
Obs.	2268	600	1668	2268	600	1668	2268	600	1668
Pseudo-R^2	0.155	0.162	0.197	0.153	0.161	0.197	0.159	0.163	0.198

Note: Standard errors are in parentheses. ***, **, and * indicate statistical significance at 1%, 5%, and 10% level, respectively.

Table 6
Full-sample estimated coefficients and changes in odds of receiving better credit rating

	Sample	Coefficient	Odds ratio
Model I	China and Japan	0.465***	1.592***
	China	0.481	1.618
	Japan	0.391***	1.479***
Model II	China and Japan	0.391***	0.998***
	China	0.003	1.003
	Japan	0.006**	1.006**
Model III (environment)	China and Japan	−0.021***	0.980***
	China	−0.015	0.985
	Japan	0.007*	1.007*
Model III (social)	China and Japan	−0.005	0.995
	China	0.000	1.000
	Japan	−0.015**	0.985**
Model III (governance)	China and Japan	0.024***	1.024***
	China	0.016	1.017
	Japan	0.011**	1.011**

Notes: ***, **, and * indicate statistical significance at 1%, 5%, and 10% level, respectively.

However, while more environmentally friendly practice also comes at cost, it is unsurprising to see better credit rating corresponding to better environmental score in a country like Japan, which stands at the end of the Environmental Kuznets Curve where people are highly concerned of environment. A Japanese company with poor environmental management could be severely punished by clients and partners and, in turn, affected by poorer company's business outlook. This is consistent with the idea of external pressure discussed in the literature review section. The positive contribution of environmental score to credit rating found in Japan herein is as well observed in Canadian and European markets in which Weber (2012) and Weber et al. (2008) respectively documented that banks integrated environmental risk into their credit risk management when lending to their clients. Last, our result shows that Japanese debt issuing companies with better governance can enjoy better credit rating. This is because better governance can bring about better management and more efficient operations; thereby, reducing financial risk from poor performance. This finding agrees with Capelle-Blancard et al. (2019) that

governance had largest positive impact on sovereign bond yield spreads, compare with the other pillars, but they did not find environmental factors to have significant effect on credit risk mitigation like what we find in Japan, which may due to the fact that their study was conducted for country-level sovereign bonds.

As for robustness check, we re-estimate Models II and III with the sub-sample that excludes observations without Bloomberg ESG score coverage. As showed in Tables 7 and 8, the sub-sample results are largely unchanged, except that the impact of the overall ESG score on better credit rating in Japan becomes insignificant. This is because the previous significance of the ESG score found when using the full sample is driven by the distinct credit ratings between the firms having ESG scores and those that do not. The finding suggests that having ESG score coverage is good for credit rating but having higher ESG score does not always translate to higher credit ratings, partly because there exist countering forces of positive impacts from the environmental (E) and governance (G) pillars and negative impact from the social pillar.

Finally, we would like to mention limitations of our study. Firstly, as illustrated in Table 2, credit rating variation is very low in China. Out of all the Chinese companies we have in the data set, 88 percent of the credit rating scores are tilted toward AA to AAA. It is possible that this lack of variation in credit ratings causes inadequate statistical power to detect the ESG effect on risk mitigation in China.

Table 7
Sub-sample estimated coefficient results

Regressors	Model II			Model III		
	China and Japan	China	Japan	China and Japan	China	Japan
ESG	−0.027***	−0.001	−0.005			
	(0.005)	(0.016)	(0.005)			
E				−0.019***	−0.014	0.007*
				(0.004)	(0.021)	(0.004)
S				−0.004	−0.002	−0.015**
				(0.005)	(0.012)	(0.006)
G				0.021***	0.032	0.014*
				(0.007)	(0.028)	(0.007)

(*continue on next page*)

Table 7 (*continued*)

Regressors	Model II			Model III		
	China and Japan	China	Japan	China and Japan	China	Japan
DE	−0.268***	−0.135	−1.045***	−0.282***	−0.131	−1.005***
	(0.069)	(0.137)	(0.095)	(0.070)	(0.138)	(0.095)
EBIT	0.842	6.990***	−4.903***	0.923	6.990***	−4.441***
	(1.028)	(2.414)	(1.205)	(1.030)	(2.395)	(1.207)
mcap	1.172***	−0.097	0.993***	1.227***	−0.106	1.016***
	(0.100)	(0.257)	(0.118)	(0.100)	(0.259)	(0.118)
rev	−0.749***	0.706**	−1.132***	−0.750***	0.738**	−1.137***
	(0.145)	(0.338)	(0.183)	(0.145)	(0.341)	(0.183)
EBITDA	0.179	−0.365	1.251***	0.183	−0.367	1.206***
	(0.125)	(0.302)	(0.171)	(0.126)	(0.303)	(0.171)
asset	0.438***	0.811***	0.506***	0.421***	0.777***	0.513***
	(0.150)	(0.279)	(0.195)	(0.150)	(0.280)	(0.195)
age	−0.023***	−0.082***	0.001	−0.022***	−0.085***	0.000
	(0.002)	(0.031)	(0.002)	(0.002)	(0.032)	(0.002)
Obs.	1,663	352	1,311	1,663	352	1,311
Pseudo-R^2	0.162	0.156	0.195	0.162	0.157	0.197

Notes: standard errors are in parentheses. ***, **, and * indicate statistical significance at 1%, 5%, and 10% level, respectively.

Table 8
Sub-sample estimated coefficients and changes in odds of receiving better credit rating

	Sample	Coefficient	Odds ratio
Model II	China and Japan	−0.027***	0.973***
	China	−0.001	0.999
	Japan	−0.005	0.995
Model III (Environment)	China and Japan	−0.019***	0.981***
	China	−0.014	0.986
	Japan	0.007*	1.007*
Model III (Social)	China and Japan	−0.004	0.996
	China	−0.002	0.998
	Japan	−0.015**	0.985**

Table 8 (*continued*)

	Sample	Coefficient	Odds ratio
Model III (Governance)	China and Japan	0.021***	1.022***
	China	0.032	1.032
	Japan	0.014*	1.014*

Note: ***, **, and * indicate statistical significance at 1%, 5%, and 10% level, respectively.

CONCLUSION

The study explores linkages between Bloomberg ESG score and performance on issuer's credit rating by providing comparative empirical evidence from two major Asian markets, namely China and Japan. The study runs both pooled and country-level analyses, as well as a sub-sample for robustness check. On the one hand, we cannot find the relationship between the ESG score and credit rating in China. On the other hand, the results from Japan suggest that having ESG coverage is greatly associated with higher credit rating. However, once having the ESG score, stronger ESG performance does not necessarily contribute to higher credit rating because there exist counter effects among the pillars: positive links from the environmental (E) and governance (G) pillars, but negative link from the social (S) pillar. Our herein finding contributes to the existing literature as another empirical evidence for the ongoing debates regarding linkages between ESG and firm performance, but specifically in the context of risk mitigation measured by credit-rating of issuers. In addition, we deliberately focus on two major Asian markets with distinct economic landscape because previous studies largely focused on Western developed markets. More importantly, although it is beyond the scope of this paper to justify the underlying reasons behind the documented heterogeneous effects of ESG on credit rating between the two countries, such heterogeneity found can translate into several important implications as well as provide ground for future research.

First of all, for investors, forming a portfolio of investment based on criteria related to ESG should be taken with care. In a country like Japan, integrating environmental and governance performance of firms to investment and risk analysis could be beneficial. However, a similar strategy for the Chinese market may not work well as other factors like political connections and government subsidies may dominate the role of ESG. Second of all, firms deciding on investing in the improvement of their ESG practice may have to consider in which market they operate and on which pillar to focus. Third of all,

for regulators, the implementation of policies related to ESG enforcement may not always result in positive outcome in terms of firms' credit risk mitigation in the eyes of credit assessors. We leave it for future research to explore how nature or culture of different markets may affect the impact of ESG on credit risk attenuation: which elements, if not all, under the social pillar have negative impact on Japanese firms' credit rating and what particular Chinese market natures weaken the effect of ESG on credit rating.

NOTES

1. Japan and China are respectively ranked the second and third largest financial market in the world, with 3,652 and 3,584 listed companies and market capitalisation value of USD6.17 trillion and USD6.09 trillion in 2018.
2. https://data.worldbank.org/indicator/NY.GDP.PCAP.CD

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