Beyond green bonds: Stock market reactions to ESG bond announcements and issuances in Japan

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Abstract

This study examines the stock market reactions to the announcements and issuances of 402 ESG bonds from 153 listed Japanese firms, employing an event study methodology. Results show strong positive market reactions to green bonds and transition bonds, while sustainability bonds evoke modest short-term positivity following their announcement. Social and sustainability-linked bonds show minimal to insignificant impact, and transition-linked bonds incurs negative stock reactions. These outcomes offer insights for the market by indicating differentiated investor perceptions of ESG bonds, for issuers by highlighting positively priced green financing instruments, and for policymakers by evaluating the effectiveness of green finance policies.

Keywords: Green bonds, Green finance, Market reactions, Event study, Third-party certification

JEL classification codes: G14, G32, Q56, Q57

1. Introduction

Recently, the urgency of addressing the energy crisis, climate change, and global warming has necessitated a paradigm shift towards a green economy. Environmental, social, and governance (ESG) factors are increasingly being integrated into corporate policies, supported by extensive literature (Bénabou and Tirole, 2010; Eccles et al., 2014; Flammer and Kacperczyk, 2016; Renneboog et al., 2008; Tang and Zhang, 2020). The Kyoto Protocol and the Paris Agreement advocate green instruments and technological innovations as key elements for ESG development (Rafique et al., 2022). The United Nations Environment Programme (UNEP) highlights green fiscal policies as crucial for mitigating climate challenges and facilitating the transition towards a green economy. Within this context, green bonds have emerged as typical instruments for promoting sustainable finance and economic transition.

Green bonds are defined as instruments whose proceeds are exclusively applied to fund or refund new or existing eligible green projects, either partially or fully, by the International Capital Market Association (ICMA) in the Green Bond Principles (GBP) (ICMA, 2021a). They diversify financing sources, raise capital, and invest in new and existing projects that benefit environmental sustainability. Green bonds. support the Sustainable Development Goals (SDGs) and the Paris Agreement by effectively subsidizing environmentally positive externalities with lower-cost capital. Typically, they have substantial size and long maturity, and receive third-party certification, making them suitable for financing large, long-duration projects (Flammer, 2020). Green bonds are vital for funding renewable energy investments (Tolliver et al., 2020), and are considered a promising tool to combat climate change (Bloomberg, 2018). Despite the growing popularity of green bonds since their first issuance by the European Investment Bank (EIB) in 2007, empirical studies on their effectiveness remain limited (Flammer, 2020).

In Japan, the Development Bank of Japan issued the country's first green bond in 2014, followed by the release of the "Green Bond Guidelines, 2017" by the Ministry of the Environment of Japan in March 2017. These guidelines promoted rapid growth in issuers and diversified sustainability-focused financial instruments, including green bonds, sustainability bonds, social bonds, transition bonds, sustainability-linked bonds (SLBs), and transition-linked bonds (TLBs). The guidelines aim to promote green bonds in Japan by increasing the credibility of their environmental benefits and reducing issuance costs and administrative burdens. Despite the increasing attention to green bonds, research on the effectiveness of other ESG bonds and the specific dynamics of Japan's ESG bond market also remains scant.

ESG bonds represent an emerging area of interest in current research. This study defines ESG bonds as financial instruments designed to enhance environmental, social, and sustainable development outcomes, including various bond types such as green, sustainability, social, transition bonds, SLBs, TLBs, and so forth. However, prior research has primarily concentrated on the determinants of green bonds (Broadstock, 2019; Dan and Tiron-Tudor et al., 2021; Hachenberg and Schiereck, 2018; Liu et al., 2021; Reboredo, 2018; Tang et al., 2023; Tolliver et al., 2020; Wang and Wang, 2022; Zerbib, 2019), the green bond premium (named "Greenium") (Baker et al., 2018; Ehlers and Packer, 2017; Gianfrate and Peri, 2019; Larcker and Watts, 2020; MacAskill et al., 2020; Nanayakkara and Colombage, 2019; Partridge and Medda, 2020; Wang et al., 2020; Zerbib, 2019), and the link between green bonds and conventional bonds (Cortellini and Panetta, 2021). There is a lack of comprehensive research on broader spectrum of ESG bonds and limited exploration of their impact on market responses.

This study provides the first empirical study on ESG bonds in Japan, aiming to fill the research gap. Employing an event study methodology, we examine the stock market reactions to the announcements and actual issuances of 402 ESG bonds by 153 listed

Japanese firms from January 2016 to December 2023. Our comprehensive dataset draws from the Ministry of the Environment of Japan, the ESG information platform, official corporate websites, and corporate social responsibility (CSR) reports of the issuers. Corporate stock data is sourced from the EOL database, and daily market returns are obtained from the Nikkei 225 index.

This study contributes by creating a unique dataset by integrating the definitional frameworks and classification standards from the ICMA and authoritative Japanese institutions on ESG bonds. Our results identify different market responses to ESG bonds: (1) The announcement and issuance of green bonds significantly boost stock positive market reactions. (2) Sustainability bonds' announcement does not significantly impact the market, except for a modest, short-lived positive response on the sixth day post-announcement. Their actual issuance does not significantly affect stock volatility. (3) The issuance of social bonds does not significantly impact the corporate stock returns of issuers. The market's response is negative before the announcement, with a periodic positive reaction thereafter. (4) Transition bonds trigger favorable market reactions at both the announcement and issuance events. (5) Announcements and issuances of SLBs and TLBs have negligible effects on stock returns. Our heterogeneity analysis indicates that firms in energy-intensive and financial industries, and those with third-party certification, exhibit more pronounced stock reactions. Robustness tests further confirm these results.

This study also enriches the literature on CSR, ESG, and socially responsible investments (SRI) by providing empirical evidence and making three critical contributions. First, for the market, this study explores the benefits to shareholders and investors from the issuance of various ESG bonds. This insight aids in developing the ESG bond market and SRI. Second, for issuers, it identifies which green financing initiatives are positively priced by market investors, helping firms refine their climate

transition financing strategies to align with market preferences. Third, for policymakers, this study verifies the effectiveness of Japan's green finance policies and reveals investor preferences, providing valuable insights and references for future green development policies.

The remainder of this study is structured as follows. Section 2 reviews relevant literature and formulates hypotheses. Section 3 outlines the research methodology. Section 4 presents and discusses this study's empirical results. 5. Heterogeneity analysis is performed in section 5 and robustness check is conducted in section 6. Section 7 provides the conclusions.

2. Literature review and hypothesis development

Research on ESG bonds has primarily focused on green bonds, with other types unexplored. Although some empirical studies have identified significant stock price reactions to green bond announcements, results are mixed. Moreover, current research often examines only stock price reactions to announcements, lacking comprehensive analysis of the impacts of both announcements and actual issuances of ESG bonds.

Building on signaling theory, green bond issuance announcements signal corporate environmental commitment, indicating an entity's determination to fulfill CSR and engage in green investments. The announcement date is critical as it represents the date on which information is conveyed to the market (Flammer, 2020). Serafeim and Yoon (2023) verified that positive ESG news triggers a positive stock price reaction, attracting investors interested in environmentally beneficial and value-driven long-term investments. Furthermore, regular reporting and third-party certification for green bonds improve information transparency (Hyun et al., 2022), thus effectively reducing information asymmetry. This helps increase stakeholder trust and enhance the positive image of firms that actively engage in ESG practices. Stakeholder trust and

responsibility have demonstrated a positive impact on firm value (Tang and Zhang, 2020).

Regarding empirical studies, Roslen et al. (2017) pioneered the study of the stock price response to green bonds and reported positive shareholder reactions following the announcements in a sample of green bonds from six countries. Baulkaran (2019) found a positive stock market reaction to the announcements of green bond issuance in Europe, the US, China, and Australia, underscoring that green bonds are valued by investors for funding profitable green projects and risk mitigation. Flammer (2020) further demonstrated that the U.S. stock market positively responds to green bond announcements. Similarly, Glavas (2020) reported a positive impact of such announcements on firms' stock prices, based on 780 corporate bonds from 18 countries over the period 2013–2018. Particularly, this stock price reaction accentuated after the Paris Agreement. In light of the extant literature and the signaling benefits conferred by ESG commitments, we propose the following hypothesis:

Hypothesis 1: The announcement of the ESG bond issuance positively influences stock prices, resulting in positive excess returns for the stock.

The study of the impact of green bond issuance on stock reactions closely relates to the literature on how CSR and ESG affect corporate value and profitability. Freeman's (1984) stakeholder theory suggests that CSR practices enhance firm value and benefit shareholders by promoting positive stakeholder relationships. Substantial studies support the positive impact of CSR performance on financial performance (Ferrell et al. 2016; Flammer 2015; Orlitzky 2001; Tsai and Wu, 2022) and report that ESG performance, ratings, and reports are positively associated with firm value (Bhaskaran et al., 2020; Fatemi et al., 2018; Li et al., 2018; Yoon et al., 2018). Additionally, better CSR and ESG performance are linked to lower financing costs and improved financial

performance (Chava, 2014; El Ghoul et al., 2011; Goss and Roberts, 2011; Sharfman and Fernando, 2008). These findings further support the argument for a positive impact of green bond issuance on stock reactions.

Upon the actual issuance of bonds, the primary concern for investors is the associated costs. Green bonds, which are integral to CSR and ESG practices, may confer a financing cost advantage over conventional bonds. This advantage can increase shareholder wealth and firm value by expanding financing channels and simultaneously reducing costs (Baulkaran, 2019). Empirical evidence supports this view. Tang and Zhang (2020) examined the financing cost channel and found that green bond issuance positively influences stock prices and stock liquidity in 28 countries. Wang et al. (2022) concluded that issuing green bonds enhances firms' capabilities in green technology and innovation by alleviating financing constraints. Zhang et al. (2024) also noted that green bond issuance significantly reduces the risk of extreme stock price declines by mitigating information asymmetry and financing constraints in Chinese firms. Therefore, we propose the following hypothesis:

Hypothesis 2: The issuance of the ESG bonds positively influences stock prices, resulting in positive excess returns for the stock.

There are different perspectives in the literature. Friedman (1970) argued that the sole objective of corporate governance is to maximize shareholder interests, implying that CSR activities may harm shareholder value by incurring additional costs (Aupperle et al., 1985). Furthermore, the agency problem (Jensen and Meckling, 1976) can cause managers to utilize CSR engagements to enhance their personal reputations rather than firm value (Bénabou and Tirole, 2010; Masulis and Reza, 2015).

Reboredo and Ugolini (2020) identified weak linkages between the green bond market and stock, energy, and high-yield corporate bond markets. Similarly, Jakubik and Uguz (2021) found that the announcements of green bond introductions by European insurance firms do not significantly impact stock prices. Instead, significant positive stock price reactions occur only when green bonds are actually issued, and green bond funds are launched. Furthermore, Lebelle et al. (2020) investigated 475 green bonds issued globally and found a significant negative stock price reaction to the announcements of green bonds, especially for first-time issuers and in developed stock markets.

The above literature base sets the stage for the empirical contribution of this study. This study aims to bridge the gap in the literature by examining the effects of ESG bond announcements and post-issuance. Therefore, further research is imperative to understand the tangible impact of ESG bonds on market valuation.

3. Research methodology

Building on studies by Dasgupta et al. (2006), Tang and Zhang (2020), and Flammer (2020), this study employs an event study approach to analyze the impact of ESG bond announcements and issuances on the stock prices of Japanese listed firms. This study aims to identify financial market preferences for corporate ESG financing and assess the market effectiveness of ESG bonds.

3.1 Data

Our bond data is sourced from the Ministry of the Environment of Japan, the ESG information platform, company websites' information bulletin, and the CSR reports. The sample includes 402 corporate ESG bonds issued by 153 Japanese firms listed on the Tokyo Stock Exchange, spanning from January 1, 2016, to December 31, 2023. The dataset comprises six ESG bond categories: 310 green bonds, 43 sustainability bonds,

22 SLBs, 13 transition bonds, 2 TLBs, and 8 social bonds, with one bond concurrently classified as green and SLBs. Stock price information is sourced from the EOL database, enabling the calculation of individual stock returns. Daily market returns are based on the Nikkei 225 index.

3.2 Event selection

We use the announcement date, or the first day of bond issuance, as the event date. The event window spans 20 days around the event date [–10, 10], with an estimation window from the 180th to the 20th trading day before the event date [–180, –20], covering a total of 160 trading days. For the empirical analysis, we compute the cumulative average abnormal returns (CAAR) and average abnormal returns (AAR) within the event window. These metrics are derived using the market model, which estimates abnormal returns by comparing actual stock performance to expected performance based on market trends.

3.3 Estimation model

Since the market model assumes that stock returns are linearly related to the returns of the market portfolio, the following model is estimated using corporate stock and market trading data within the estimation window [–180, –20]:

$$r_{it} = \alpha_i + \beta_i r_{mt} + \varepsilon_{it}. \quad (1)$$

where r_{it} denotes the stock return of firm i on day t, r_{mt} denotes the return on the market index at time t, and ε_{it} denotes the stochastic disturbance term.

The estimated return on the stock of firm i during the event window [–10, 10] can then be calculated according to the following formula:

$$\hat{r}_{it} = \hat{\alpha}_i + \hat{\beta}_i r_{mt} \quad (2)$$

The abnormal return (AR) of firm i on day t is calculated by the difference between the actual return and the estimated return as follows:

$$AR_{it} = r_{it} - \hat{r}_{it} \quad (3)$$

For each time t in the event window, we average the abnormal returns across all N stocks in the sample:

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it} \quad (4)$$

By summing the AAR over a given time period within the event window, the CAAR for that time period can be calculated as follows:

$$CAAR_{t_1,t_2} = \sum_{t=t_1}^{t_2} AAR_t \quad (5)$$

3.4 Descriptive statistics

The descriptive statistics in Table 1 present key metrics for ESG bonds issued by listed Japanese firms, including issuance numbers, amounts, maturities, coupon rates, and third-party certification rates. Green bonds dominate in number, indicating a strong focus on environmental projects. SLBs report the highest average issuance at 18.86 billion yen, reflecting substantial investment in sustainability-related projects. TLBs, while the smallest in number, have the highest issuance amount of 50 billion yen and the longest maturity at 15 years, indicating the extended timeline required for transition projects. The average maturity of ESG bonds varies considerably, with TLBs having the longest at 15 years. Higher coupon rates for TLBs, transition bonds, and green bonds suggest a market premium for sustainability. Third-party certification rates are 100% for all ESG bond types except green bonds, showing the importance of credibility and standardization in ESG development.

	Green bonds	Sustainability bonds	SLBs	Social bonds	Transition bonds	TLBs
Observations	310	43	22	8	13	2
Issuance amount	15.36	15.71	18.86	13.27	13.42	50
Maturity	8.33	10.36	7.86	5.88	9.03	15
Coupon rate	0.73%	0.52%	0.50%	0.45%	0.74%	1.09%
Third-party certification	97.10%	100%	100%	100%	100%	100%

Table 1. Summary statistics of ESG bonds issued by listed Japanese firms

This table reports descriptive statistics for all green bonds, sustainability bonds, SLBs, social bonds, transition bonds, and TLBs issued by listed Japanese firms from January 1, 2016, to December 31, 2023. Observations signify the number of bonds observed. The issuance amount is reported in billions of yen. Maturity refers to the maturity of the bonds in years. Coupon rate denotes bond coupon rates. Third-party certification indicates the percentage of bonds with third-party certification. All values are sample means.

4. Results and discussion

Table 2 shows the stock reactions to the announcement and issuance of green bonds, suggesting the cumulative abnormal returns (CAR) in ten event windows and the abnormal returns (AR). When using the announcement dates of green bonds as the event dates, the CAAR across five event windows is significantly positive at the 1% significance level at 3.3%, 3.2%, 3.6%, 3.8%, and 3.9%, respectively. Additionally, the AAR on the sixth day before the announcement is significant at the 1% significance level of 2.5%. These outcomes confirm the market's strong optimism about green investment opportunities, supporting Hypothesis 1. These outcomes align with the signaling theory and findings from Baulkaran (2019), Flammer (2020), Glavas (2020), and Roslen et al. (2017), reinforcing the perceived market value of green bonds.

Moreover, the issuance of green bonds results in significant positive CAAR of 3.3%, 3.4%, 3.4%, 3.5%, and 3.3% across five event windows when using the actual issuance date as the event date. These results strongly support that the formal issuance of green bonds significantly enhances stock prices, aligning with Hypothesis 2. Additionally, the AAR on the sixth day before issuance is significant at the 1% significance level of 3%. Since most green bonds are issued within ten days of the announcement, overlapping event windows reflect pre-event information, allowing investors time to react. The average increase in stock prices in the six days prior to issuance indicates investor confidence in green bond issuances. These results support the financing cost theory, suggesting that green bond issuances lower financing costs and alleviate financing constraints, aligning with findings from Jakubik and Uguz (2021), Tang and Zhang (2020), Wang et al. (2022), and Zhang et al. (2024).

	Green bond issuance			Green bond announcement		
	N	Mean	t-test	N	Mean	t-test
CAR [–1,1]	283	–0.0018449	0.70649022	286	0.0016362	0.7348984
CAR [–2,2]	284	–0.00058068	0.92652373	288	0.00353935	0.56754121
CAR [–3,3]	284	0.00114762	0.87767834	288	0.00200549	0.78433955
CAR [–4,4]	283	0.00175919	0.83635016	288	0.00508534	0.5411923
CAR [–5,5]	284	0.00366833	0.69516817	288	0.00670277	0.4661419
CAR [–6,6]	284	0.03339024	0.00129123***	288	0.03274789	0.00126808***
CAR [–7,7]	284	0.03350611	0.00258232***	288	0.03210568	0.00323504***
CAR [–8,8]	284	0.03424535	0.00381698***	288	0.03578455	0.00214544***
CAR [–9,9]	284	0.03470679	0.00550031***	288	0.03805114	0.00203707***
CAR [–10,10]	283	0.03291259	0.0124824**	288	0.03909719	0.00258668***
AR (–10)	284	–0.00133346	0.62778107	288	0.00095542	0.72478398
AR (–9)	284	0.00093594	0.73357285	288	0.00181679	0.50340434
AR (–8)	284	0.00029711	0.9139409	288	0.00217106	0.42406839
AR (–7)	284	0.00004082	0.98815481	288	0.00053181	0.84461195
AR (–6)	284	0.02963856	9.859E–21***	288	0.02540416	6.594E–17***
AR (–5)	283	0.00101323	0.71348799	288	0.00119889	0.65867748
AR (–4)	284	0.00082307	0.76467845	288	0.00246957	0.3633351
AR (–3)	284	0.00137932	0.61600915	288	–0.00166703	0.53917847
AR (–2)	283	0.00020164	0.94173784	287	–0.00058313	0.83042067
AR (–1)	284	–0.00027793	0.91947572	288	–0.00013435	0.96050567
AR (0)	284	–0.00139639	0.61165253	288	0.00141568	0.60198005
AR (1)	284	–0.00013205	0.96169172	287	0.00035437	0.89644544
AR (2)	284	0.00102475	0.70939943	288	0.00248599	0.36016278
AR (3)	284	0.00034899	0.89898933	288	0.00013318	0.9608521
AR (4)	284	–0.00018525	0.94627843	288	0.00061028	0.82204779
AR (5)	284	0.00087322	0.75080629	288	0.00041854	0.87740848
AR (6)	284	0.00008335	0.97581482	288	0.00064097	0.81326132
AR (7)	284	0.00007505	0.97822134	288	–0.00117402	0.66531704
AR (8)	284	0.00044213	0.87223894	288	0.00150782	0.5785748
AR (9)	284	–0.0004745	0.86297716	288	0.0004498	0.86833205
AR (10)	283	–0.00036059	0.89601538	288	0.00009063	0.97335393

Table 2. The stock reactions around announcements and issuance of green bonds

This table reports the AR from day –10 to day 10 and CAR in different event windows ([–1, 1], [–2,2], [–3, 3], [–4,4], [–5,5], [–6,6], [–7,7], [–8,8], [–9,9], and [–10, 10]) for green bond issuance and announcement. The number of stock observations (N) and the mean of AR and CAR (Mean), i.e., AAR and CAAR, are also reported. P-values for t-tests on the null hypothesis that AAR or CAAR equals zero are provided. ***, **, and * denote the 1%, 5%, and 10% levels of statistical significance, respectively.

Table 3 shows stock reactions to the announcement and issuance of sustainability bonds. When using announcement dates as event dates, CAAR is not significantly positive under any of the ten event windows. This indicates that the market does not react positively in a way that accumulates over time to the announcement of sustainability bonds, refuting Hypothesis 1. Conversely, AAR is positive at 0.5% on the sixth day after the announcement, indicating a modest increase in returns beyond typical market movements on that particular day. These results imply that investors do not perceive these announcements as particularly beneficial to the issuer's value or future prospects.

When using actual issuance dates as event dates, CAAR is positive under all ten event windows except for one event window of [–1, 1], but none are significant, suggesting that sustainability bond issuance does not lead to significant stock price volatility. Thus, Hypothesis 2 is rejected. On the day of issuance and by the third day forward, AAR is significant at the 5% significance level at 0.6% and 0.7%, respectively. These results suggest that the market reacts positively to the actual issuance of the sustainability bonds, possibly due to investor confidence in the firm's commitment to sustainability practices, although this reaction is relatively short-lived.

	Sustainability bond issuance			Sustainability bond announcement		
	N	Mean	t-test	N	Mean	t-test
CAR [–1,1]	40	–0.0041114	0.47539497	38	0.00304587	0.62528205
CAR [–2,2]	40	0.00144306	0.84613764	38	0.00177755	0.82537821
CAR [–3,3]	40	0.00741719	0.40014856	38	0.00117555	0.90192887
CAR [–4,4]	40	0.00325113	0.74532349	38	0.00369201	0.73381681
CAR [–5,5]	40	0.00874042	0.4314101	38	0.00264905	0.82588228
CAR [–6,6]	40	0.00592191	0.62551536	38	0.01064129	0.41942843
CAR [–7,7]	40	0.00670379	0.60890305	38	0.00718562	0.61412114
CAR [–8,8]	40	0.00783704	0.57761665	38	0.01190251	0.4375712
CAR [–9,9]	40	0.01076203	0.47398261	38	0.009194	0.57482577
CAR [–10,10]	40	0.01049787	0.51164526	38	0.01265965	0.46877215
AR (–10)	40	0.00202665	0.46655994	38	0.00463278	0.11612489
AR (–9)	40	0.00240133	0.38846611	38	–0.0016271	0.57976573
AR (–8)	40	0.00151469	0.58619168	38	0.00107331	0.71483624
AR (–7)	40	–0.0015429	0.57923675	38	–0.0033525	0.25464598

AR (–6)	40	–0.002748	0.32386091	38	0.00307782	0.29549649
AR (–5)	40	0.00259731	0.35102515	38	–0.0008231	0.77930812
AR (–4)	40	–0.0010936	0.69424164	38	0.00406397	0.16772071
AR (–3)	40	0.00562359	0.04452131**	38	–0.0008782	0.76497408
AR (–2)	40	0.00357954	0.1992442	38	–0.0016714	0.56950315
AR (–1)	40	0.00193902	0.48601898	38	–0.0002153	0.94157036
AR (0)	40	0.0065653	0.01927129**	38	–0.000252	0.93162982
AR (1)	40	0.00051482	0.85315302	38	0.00351312	0.23268382
AR (2)	40	0.00197496	0.47798528	38	0.00040306	0.89084914
AR (3)	40	0.00035054	0.89970333	38	0.00027615	0.92508987
AR (4)	40	–0.0030725	0.27019239	38	–0.0015475	0.59842261
AR (5)	40	0.00289198	0.29924008	38	–0.0002199	0.94033047
AR (6)	40	–7.049E–05	0.97977852	38	0.00491442	0.09572088*
AR (7)	40	0.00232481	0.40372751	38	–0.0001032	0.97197826
AR (8)	40	–0.0003815	0.89091442	38	0.00364358	0.21587044
AR (9)	40	0.00052367	0.85065932	38	–0.0010814	0.71277539
AR (10)	40	–0.0022908	0.41062289	38	–0.0011671	0.69115526

Table 3. The stock reactions around announcements and issuance of sustainability bonds

This table reports the AR from day –10 to day 10 and CAR in different event windows ([–1, 1], [–2,2], [–3, 3], [–4,4], [–5,5], [–6,6], [–7,7], [–8,8], [–9,9], and [–10, 10]) for sustainability bond issuance and announcement. The number of stock observations (N) and the mean of AR and CAR (Mean), i.e., AAR and CAAR, are also reported. P-values for t-tests on the null hypothesis that AAR or CAAR equals zero are provided. ***, **, and * denote the 1%, 5%, and 10% levels of statistical significance, respectively.

Table 4 shows stock reactions to the announcement and issuance of social bonds. The CAAR under the ten event windows is insignificant, indicating that social bond events do not have a material impact on corporate stock prices, thus rejecting Hypothesis 1 and Hypothesis 2 for social bonds. However, the AAR is significantly negative at –0.97% and –1.03% at the 10% and 5% significance levels on the 8th and 9th days before the announcement, suggesting a negative response to the announcement of social bond issuance. Conversely, when using issuance dates as event dates, AAR is significantly positive at the 10%, 10%, and 1% significance levels on the 7th, 9th, and 10th days after issuance, at 0.96%, 1%, and 1.34%, respectively. These findings suggest a positive market reaction to the actual issuance. Overall, these results suggest a lagged, positive response to announcements concentrated after the actual issuance of the social bonds, but this response does not sustainably affect the cumulative abnormal returns.

	Social bond issuance			Social bond announcement		
	N	Mean	t-test	N	Mean	t-test
CAR [–1,1]	8	0.00416097	0.72356397	8	0.00845137	0.46840629
CAR [–2,2]	8	0.0036042	0.81252061	8	0.01069744	0.47837822
CAR [–3,3]	8	–0.0061201	0.7336217	8	0.01101508	0.53669434
CAR [–4,4]	8	–0.0005067	0.98016436	8	0.01100281	0.58702213
CAR [–5,5]	8	–0.0048655	0.82916359	8	0.01580151	0.47982079
CAR [–6,6]	8	–0.0041042	0.86706522	8	0.01791331	0.46265681
CAR [–7,7]	8	0.00497995	0.85017704	8	0.01482236	0.57125593
CAR [–8,8]	8	–0.0089137	0.75148447	8	0.00375993	0.89246613
CAR [–9,9]	8	0.00849111	0.77552569	8	–0.0086462	0.76890832
CAR [–10,10]	8	0.01716995	0.584104	8	–0.0138752	0.65389596
AR (–10)	8	–0.0048022	0.35128202	8	–0.005435	0.29186888
AR (–9)	8	0.00742795	0.15013829	8	–0.0102644	0.04750449**
AR (–8)	8	–0.0072504	0.16006051	8	–0.0096754	0.06157572*
AR (–7)	8	–0.0004827	0.92525771	8	–0.0063067	0.22157738
AR (–6)	8	0.00394211	0.44396669	8	0.00626766	0.22443875
AR (–5)	8	–0.0037042	0.47190354	8	0.0031403	0.54204763
AR (–4)	8	0.00430082	0.40370521	8	–0.0025779	0.61663733
AR (–3)	8	–0.0029422	0.56761569	8	–0.0037323	0.46876508
AR (–2)	8	0.00038961	0.93963556	8	–0.001836	0.72138478
AR (–1)	8	0.00642325	0.21297685	8	0.00274751	0.59366765
AR (0)	8	–0.0010024	0.84553599	8	–0.0018409	0.72067241
AR (1)	8	–0.0012599	0.80656323	8	0.00754473	0.14406603
AR (2)	8	–0.0009464	0.8540625	8	0.00408203	0.4282165
AR (3)	8	–0.0067821	0.18863451	8	0.00404995	0.43184834
AR (4)	8	0.00131254	0.79865429	8	0.00256564	0.61831401
AR (5)	8	–0.0006546	0.89875185	8	0.00165841	0.74735195
AR (6)	8	–0.0031808	0.53665616	8	–0.0041559	0.4199271
AR (7)	8	0.00956683	0.06439058*	8	0.00321577	0.53239375
AR (8)	8	–0.0066432	0.19779687	8	–0.001387	0.78760262
AR (9)	8	0.00997687	0.05387613*	8	–0.0021417	0.67743289
AR (10)	8	0.013481	0.00952653***	8	0.00020605	0.96806869

Table 4. The stock reactions around announcements and issuance of social bonds

This table reports the AR from day –10 to day 10 and CAR in different event windows ([–1, 1], [–2,2], [–3, 3], [–4,4], [–5,5], [–6,6], [–7,7], [–8,8], [–9,9], and [–10, 10]) for social bond issuance and announcement. The number of stock observations (N) and the mean of AR and CAR (Mean), i.e., AAR and CAAR, are also reported. P-values for t-tests on the null hypothesis that AAR or CAAR equals zero are provided. ***, **, and * denote the 1%, 5%, and 10% levels of statistical significance, respectively.

Table 5 shows stock reactions to the announcement and issuance of transition bonds. CAAR is statistically significant under all ten event windows when using announcement dates as event dates. This suggests that the market views the announcement of the issuance of transition bonds as a meaningful signal that positively affects the valuation of the issuing company, supporting Hypothesis 1. Furthermore, AAR is significantly higher than zero on days 1, 2, 4, 5, and 9 after the announcement, suggesting a positive market reaction as investors process the news (Serafeim and Yoon, 2023).

Similarly, when using issuance dates as event dates, CAAR under all ten event windows is significantly positive at the 1% significance level. This reinforces the idea that the market views the issuance of transition bonds positively, supporting Hypothesis 2. AAR is significantly positive on the second and third days before the issuance, on the issuance day, and on the first, fourth, and ninth days after issuance. This indicates a prevailing positive attitude before issuance, possibly influenced by the announcement. The strong positive reaction continues on the issuance day and persists afterward. Overall, transition bond issuance is viewed favorably by the market both at announcement and issuance, with a consistent positive CAAR indicating a lasting positive effect on stock prices surrounding the event date.

	Transition bond issuance			Transition bond announcement		
	N	Mean	t-test	N	Mean	t-test
CAR [–1,1]	13	0.04466841	0.00001069***	11	0.01867339	0.08765338*
CAR [–2,2]	13	0.05252284	0.00005743***	11	0.02626229	0.06316098*
CAR [–3,3]	13	0.0668757	0.00001644***	11	0.03869591	0.0215679**
CAR [–4,4]	13	0.09671372	0.00000006633***	11	0.04935155	0.01004976**
CAR [–5,5]	13	0.09160825	0.000002971***	11	0.05850104	0.00617663***
CAR [–6,6]	13	0.08348874	0.00008175***	11	0.07131107	0.00219605***
CAR [–7,7]	13	0.09352726	0.00004736***	11	0.07907117	0.00162513***
CAR [–8,8]	13	0.0980637	0.00007331***	11	0.0948913	0.00045337***
CAR [–9,9]	13	0.10616353	0.00006357***	11	0.11748276	0.00005297***
CAR [–10,10]	13	0.10460192	0.00022181***	11	0.10662294	0.00052187***
AR (–10)	13	–0.0055881	0.3146434	11	–0.0028402	0.64572107

AR (–9)	13	–0.0023124	0.67693987	11	0.00411174	0.50587564
AR (–8)	13	–0.0001892	0.97280423	11	0.00680835	0.27122453
AR (–7)	13	0.00428927	0.43992534	11	0.00510187	0.40927804
AR (–6)	13	–0.0015337	0.78225952	11	0.00690051	0.26481453
AR (–5)	13	–0.0029418	0.59613929	11	–0.0067417	0.27592484
AR (–4)	13	0.00783047	0.1594663	11	–0.0027582	0.65527192
AR (–3)	13	0.0116991	0.0362646**	11	0.00815812	0.18774395
AR (–2)	13	0.0099362	0.07477749*	11	–0.0029548	0.63247248
AR (–1)	13	0.00764682	0.1694195	11	–0.0060546	0.32766676
AR (0)	13	0.01946015	0.00057749***	11	0.00765703	0.21617146
AR (1)	13	0.01756143	0.00182875***	11	0.01707093	0.006304***
AR (2)	13	–0.0020818	0.70757835	11	0.01054374	0.08924629*
AR (3)	13	0.00265376	0.63257223	11	0.00427549	0.48910732
AR (4)	13	0.02200755	0.00010752***	11	0.01341388	0.03108617**
AR (5)	13	–0.0021637	0.69664041	11	0.01589121	0.01087442**
AR (6)	13	–0.0065859	0.23628199	11	0.00590951	0.33935414
AR (7)	13	0.00574925	0.30093562	11	0.00265823	0.66699756
AR (8)	13	0.0047256	0.39492795	11	0.00901179	0.14587676
AR (9)	13	0.01041221	0.06200252*	11	0.01847972	0.00316648***
AR (10)	13	0.00402648	0.4684006	11	–0.0080196	0.19530962

Table 5. The stock reactions around announcements and issuance of transition bonds

This table reports the AR from day –10 to day 10 and CAR in different event windows ([–1, 1], [–2,2], [–3, 3], [–4,4], [–5,5], [–6,6], [–7,7], [–8,8], [–9,9], and [–10, 10]) for transition bond issuance and announcement. The number of stock observations (N) and the mean of AR and CAR (Mean), i.e., AAR and CAAR, are also reported. P-values for t-tests on the null hypothesis that AAR or CAAR equals zero are provided. ***, **, and * denote the 1%, 5%, and 10% levels of statistical significance, respectively.

Table 6 shows stock reactions to the announcement and issuance of SLBs. The CAAR under the ten event windows is statistically insignificant. Neither the actual issuance nor the announcement significantly affects stock prices beyond normal market fluctuations, refuting Hypothesis 1 and Hypothesis 2. Moreover, AAR does not respond significantly to these events. This suggests that, on average, the issuance and announcement of SLBs do not influence stock prices on those dates. Overall, the stock market does not react strongly to the SLBs initiatives, implying that the market does not view these events as significantly influencing the valuation or outlook of the firms.

	SLBs issuance			SLBs announcement		
	N	Mean	t-test	N	Mean	t-test

CAR [–1,1]	21	–0.0018024	0.98304873	20	0.000168	0.99849274
CAR [–2,2]	21	0.00648498	0.95275574	20	0.00070183	0.99512698
CAR [–3,3]	21	0.00343768	0.97883345	20	–0.0013302	0.99218617
CAR [–4,4]	21	0.00240457	0.98691537	20	–0.0034819	0.98197376
CAR [–5,5]	21	0.00418096	0.97941063	20	0.00009166	0.99957081
CAR [–6,6]	21	–0.0005336	0.99758351	20	0.00204552	0.99119197
CAR [–7,7]	21	–0.0030113	0.98736189	20	0.00743667	0.97026235
CAR [–8,8]	21	–0.004576	0.98198162	20	0.00938878	0.96486475
CAR [–9,9]	21	–0.0028819	0.9892819	20	0.01454855	0.94860671
CAR [–10,10]	21	0.00115262	0.99593981	20	0.00733603	0.97542351
AR (–10)	21	0.00582702	0.90209053	20	–0.0063598	0.89822553
AR (–9)	21	0.00366815	0.93827056	20	0.00342096	0.94514773
AR (–8)	21	0.00545441	0.90832243	20	0.00271268	0.95649162
AR (–7)	21	–0.0027603	0.95352741	20	0.00042123	0.99324057
AR (–6)	21	–0.0013979	0.97645508	20	0.00416097	0.93330782
AR (–5)	21	0.00154839	0.97392139	20	0.00161541	0.97408215
AR (–4)	21	–0.0034957	0.94116704	20	0.00303708	0.95129469
AR (–3)	21	–0.0072109	0.87900063	20	–0.0064232	0.89721608
AR (–2)	21	0.00350826	0.94095629	20	0.00286552	0.95404286
AR (–1)	21	0.00154656	0.97395217	20	0.00170964	0.97257101
AR (0)	21	–0.000776	0.98692775	20	–0.003933	0.93695353
AR (1)	21	–0.0025729	0.95667931	20	0.00239138	0.96164062
AR (2)	21	0.00477914	0.91963089	20	–0.0023317	0.96259728
AR (3)	21	0.00416362	0.92995292	20	0.00439122	0.92962672
AR (4)	21	0.00246261	0.9585351	20	–0.0051888	0.91688782
AR (5)	21	0.00022801	0.99615916	20	0.00195812	0.96858642
AR (6)	21	–0.0033166	0.94417619	20	–0.0022071	0.96459441
AR (7)	21	0.00028258	0.99523982	20	0.00496992	0.92038187
AR (8)	21	–0.0070191	0.88219597	20	–0.0007606	0.98779558
AR (9)	21	–0.0019741	0.96675545	20	0.00173882	0.97210307
AR (10)	21	–0.0017925	0.96981157	20	–0.0008528	0.98631647

Table 6. The stock reactions around announcements and issuance of SLBs

This table reports the AR from day –10 to day 10 and CAR in different event windows ([–1, 1], [–2,2], [–3, 3], [–4,4], [–5,5], [–6,6], [–7,7], [–8,8], [–9,9], and [–10, 10]) for the issuance and announcement of SLBs. The number of stock observations (N) and the mean of AR and CAR (Mean), i.e., AAR and CAAR, are also reported. P-values for t-tests on the null hypothesis that AAR or CAAR equals zero are provided. ***, **, and * denote the 1%, 5%, and 10% levels of statistical significance, respectively.

Table 7 presents the stock reactions to the announcement and issuance of TLBs. CAAR is positive but insignificant under all ten event windows when using the announcement dates as event dates, suggesting that the market does not consider the announcement

particularly informative or impactful. Thus, Hypothesis 1 is rejected for TLBs. AAR is significantly positive on the 4th and 3rd days before the announcement but turns significantly negative on the 3rd and 6th days after the announcement, suggesting a potential reassessment by investors or reactions to further disclosures after the announcement.

When using issuance dates as event dates, CAAR is significantly negative under five event windows: –4.01%, –5.51%, –12.17%, –7.94%, –9.07%, and –9.15%, respectively. Therefore, Hypothesis 2 is rejected for TLBs. The AAR is significantly positive on the seventh day before issuance, while post-issuance responses are mainly negative. These results indicate overall negative investor sentiment following the issuance of TLBs, possibly reflecting concerns about the issuers' financial position or business strategy related to the TLBs.

	TLBs issuance			TLBs announcement		
	N	Mean	t-test	N	Mean	t-test
CAR [–1,1]	2	–0.0401788	0.07460084*	2	–0.0027606	0.89834637
CAR [–2,2]	2	–0.0550725	0.06016012*	2	–0.0032209	0.90797503
CAR [–3,3]	2	–0.1216753	0.00053852***	2	0.00186509	0.95485675
CAR [–4,4]	2	–0.0794263	0.0423901**	2	0.01752045	0.63878973
CAR [–5,5]	2	–0.0907314	0.03574596**	2	0.02763044	0.50330752
CAR [–6,6]	2	–0.0914643	0.05120022*	2	0.00583723	0.89646651
CAR [–7,7]	2	–0.0679696	0.17646059	2	0.00227089	0.96246743
CAR [–8,8]	2	–0.0385244	0.47254579	2	0.01435826	0.78075689
CAR [–9,9]	2	–0.0075964	0.89366145	2	0.00486058	0.92933418
CAR [–10,10]	2	0.0037454	0.95014878	2	–0.0150643	0.79496748
AR (–10)	2	0.00729087	0.53993426	2	–0.00084	0.94276093
AR (–9)	2	0.01085714	0.36173842	2	0.00486947	0.67732342
AR (–8)	2	0.00998681	0.4014053	2	0.0050288	0.66739517
AR (–7)	2	0.04757463	0.00009387***	2	0.00731764	0.53189812
AR (–6)	2	0.01335708	0.26215497	2	0.00907401	0.43840311
AR (–5)	2	0.00333919	0.77883072	2	0.01042198	0.37360716
AR (–4)	2	0.01348748	0.25754405	2	0.02878072	0.01480492**
AR (–3)	2	–0.0160733	0.17761289	2	0.03046585	0.00996784***
AR (–2)	2	–0.0036887	0.7563834	2	0.00834814	0.47584013
AR (–1)	2	–0.0139281	0.24238577	2	0.00841333	0.47240675

AR (0)	2	–0.0368318	0.00226775***	2	–0.0012929	0.91200301
AR (1)	2	0.01058103	0.37404558	2	–0.009881	0.39885926
AR (2)	2	–0.011205	0.34660295	2	–0.0088084	0.45189945
AR (3)	2	–0.0505294	0.00003531***	2	–0.0253799	0.0312732**
AR (4)	2	0.02876149	0.01651175**	2	–0.0131254	0.26283674
AR (5)	2	–0.0146444	0.21911426	2	–0.000312	0.97872478
AR (6)	2	–0.0140899	0.23697884	2	–0.0308672	0.00904952***
AR (7)	2	–0.0240799	0.04415955**	2	–0.010884	0.35285104
AR (8)	2	0.01945838	0.10312205	2	0.00705857	0.54650475
AR (9)	2	0.02007084	0.09281005*	2	–0.0143672	0.22051175
AR (10)	2	0.00405093	0.73334174	2	–0.0190849	0.10425739

Table 7. The stock reactions around announcements and issuance of TLBs

This table reports the AR from day –10 to day 10 and CAR in different event windows ([–1, 1], [–2,2], [–3, 3], [–4,4], [–5,5], [–6,6], [–7,7], [–8,8], [–9,9], and [–10, 10]) for the issuance and announcement of TLBs. The number of stock observations (N) and the mean of AR and CAR (Mean), i.e., AAR and CAAR, are also reported. P-values for t-tests on the null hypothesis that AAR or CAAR equals zero are provided. ***, **, and * denote the 1%, 5%, and 10% levels of statistical significance, respectively.

5. Conclusion

This study investigates stock market reactions to 402 ESG bonds in Japan, including a variety of sustainable finance instruments such as green bonds, sustainability bonds, social bonds, transition bonds, SLBs, and TLBs.

Green bonds exhibit a highly positive market reaction at the announcement and issuance events. This suggests that they are perceived as indicators of better CSR or ESG practices, reflecting a strong market optimism towards green investments. Transition bonds also generate positive stock reactions, indicating strong market support for firms contributing to environmental transition efforts. Sustainability bonds show a modest and transient positive reaction on the sixth day after the announcement but no significant cumulative positive reaction overall, implying cautious market perceptions. Social bonds and SLBs do not show significant impacts on stock returns, while TLBs experience skepticism post-issuance with negative market responses. These results suggest that these bonds are not considered to significantly impact the valuation or future prospects of the issuers. Overall, these findings indicate the different

market valuations of the environmental and social commitments signified by various sustainable finance instruments.

Furthermore, this study reveals that third-party certified ESG bonds cause significant positive stock price reactions and greater investor trust. Particularly, ESG bonds from the electricity and gas sectors in resource-limited Japan boost stock returns. Finance-related sectors also benefit from ESG bond issuances. However, heavy industries like manufacturing, construction, and mining exhibit investor skepticism regarding the effectiveness of ESG bonds, indicating doubts about their capacity to implement effective ESG practices.

References

Aupperle, K. E., Carroll, A. B., & Hatfield, J. D. (1985). An empirical examination of the relationship between corporate social responsibility and profitability. *Academy of Management Journal*, *28*(2), 446–463. https://www.jstor.org/stable/256210.

Baker, M. P., Bergstresser, D. B., Serafeim, G., & Wurgler, J. A. (2018). Financing the response to climate change: The pricing and ownership of U.S. green bonds. *NBER Working Papers*, *25194*. https://doi.org/10.2139/ssrn.3275327.

Baulkaran, V. (2019). Stock market reaction to green bond issuance. *Journal of Asset Management*, *20*(5), 331–340. https://doi.org/10.1057/s41260-018-00105-1.

Bénabou, R., & Tirole, J. (2010). Individual and corporate social responsibility. *Economica*, *77*(305), 1–19. https://doi.org/10.1111/j.1468-0335.2009.00843.x.

Bhaskaran, R. K., Ting, I. W. K., Sukumaran, S. K., & Sumod, S. D. (2020). Environmental, social and governance initiatives and wealth creation for firms: An empirical examination. *Managerial and Decision Economics*, *41*(5), 710–729. https://doi.org/10.1002/mde.3131.

Bloomberg. (2018). *Security that triggered a recession reworked to green the earth*. Retrieved from https://www.bloomberg.com/news/articles/2018-10-09/security-that-triggered-a-recession-reworked-to-green-the-earth. Accessed January 6, 2024

Broadstock, D. C., & Cheng, L. T. W. (2019). Time-varying relation between black and green bond price benchmarks: Macroeconomic determinants for the first decade. *Finance Research Letters*, *29*, 17–22. https://doi.org/10.1016/j.frl.2019.02.006.

Chava, S. (2014). Environmental externalities and cost of capital. *Management Science*, *60*(9), 2223–2247. https://doi.org/10.1287/mnsc.2013.1863.

Cortellini, G., & Panetta, I. C. (2021). Green bond: A systematic literature review for future research agendas. *Journal of Risk and Financial Management*, *14*(12), 589. https://doi.org/10.3390/jrfm14120589.

Dan, A., & Tiron-Tudor, A. (2021). The determinants of green bond issuance in the European Union. *Journal of Risk and Financial Management*, *14*(9), 446. https://doi.org/10.3390/jrfm14090446.

Dasgupta, S., Hong, J. H., Laplante, B., & Mamingi, N. (2006). Disclosure of environmental violations and stock market in the Republic of Korea. *Ecological Economics*, *58*(4), 759–777. https://doi.org/10.1016/j.ecolecon.2005.09.003.

Eccles, R. G., Ioannou, I., & Serafeim, G. (2014). The impact of corporate sustainability on organizational processes and performance. *Management Science*, *60*(11), 2835–2857. https://www.jstor.org/stable/24550546.

Ehlers, T., & Packer, F. (2017). Green bond finance and certification. *BIS Quarterly Review*, *September*. https://econpapers.repec.org/RePEc:bis:bisqtr:1709h.

El Ghoul, S., Guedhami, O., Kwok, C. C. Y., & Mishra, D. R. (2011). Does corporate social responsibility affect the cost of capital? *Journal of Banking & Finance*, *35*(9), 2388–2406. https://doi.org/10.1016/j.jbankfin.2011.02.007.

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics,* *33*(1), 3–56. https://doi.org/10.1016/0304-405X(93)90023-5.

Fatemi, A., Glaum, M., & Kaiser, S. (2018). ESG performance and firm value: The moderating role of disclosure. *Global Finance Journal*, *38*, 45–64. https://doi.org/10.1016/j.gfj.2017.03.001.

Ferrell, A., Liang, H., & Renneboog, L. (2016). Socially responsible firms. *Journal of Financial Economics*, *122*(3), 585–606. https://doi.org/10.1016/j.jfineco.2015.12.003.

Financial Services Agency of Japan. (2021). *Social Bond Guidelines*. Retrieved from https://www.fsa.go.jp/news/r3/singi/20211026-2/02.pdf. Accessed January 6, 2024

Financial Services Agency of Japan, Ministry of Economy, Trade and Industry of Japan, Ministry of the Environment of Japan. (2021). *Basic Guidelines on Climate Transition Finance*. Retrieved from https://www.fsa.go.jp/news/r2/singi/20210507_2/04.pdf. Accessed January 6, 2024

Flammer, C. (2015). Does corporate social responsibility lead to superior financial performance? A regression discontinuity approach. *Management Science*, *61*(11), 2549–2568. https://doi.org/10.1287/mnsc.2014.2038.

Flammer, C. (2020). Green bonds: Effectiveness and implications for public policy. *Environmental and Energy Policy and the Economy*, *1*, 95–128. https://doi.org/10.1086/706794.

Flammer, C., & Kacperczyk, A. (2016). The impact of stakeholder orientation on innovation: Evidence from a natural experiment. *Management Science*, *62*(7), 1982–2001. https://doi.org/10.1287/mnsc.2015.2229.

Freeman, R. E. (1984). *Strategic Management: A Stakeholder Approach*. Cambridge University Press.

Friedman, M. (1970). *The social responsibility of business is to increase its profits*. Retrieved from https://www.nytimes.com/1970/09/13/archives/a-friedman-

doctrine-the-social-responsibility-of-business-is-to.html. Accessed January 20, 2024

Gianfrate, G., & Peri, M. (2019). The green advantage: Exploring the convenience of issuing green bonds. *Journal of Cleaner Production*, *219*, 127–135. https://doi.org/10.1016/j.jclepro.2019.02.022.

Glavas, D. (2020). How do stock prices react to green bond issuance announcements? *Finance*, *41*(1), 7–51. https://doi.org/10.2139/ssrn.3279069.

Goss, A., & Roberts, G. S. (2011). The impact of corporate social responsibility on the cost of bank loans. *Journal of Banking & Finance*, *35*(7), 1794–1810. https://doi.org/10.1016/j.jbankfin.2010.12.002.

Hachenberg, B., & Schiereck, D. (2018). Are green bonds priced differently from conventional bonds? *Journal of Asset Management*, *19*(6), 371–383. https://doi.org/10.1057/s41260-018-0088-5.

Hyun, S., Park, D., & Tian, S. (2022). The price of frequent issuance: The value of information in the green bond market. *Economic Change and Restructuring*, *56*, 3041–3063. https://doi.org/10.1007/s10644-022-09417-0.

International Capital Market Association (ICMA). (2021a). *Green Bond Principles (GBP)*. Retrieved from https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/green-bond-principles-gbp/. Accessed January 20, 2024

International Capital Market Association (ICMA). (2021b). *Sustainability Bond Guidelines (SBG)*. Retrieved from https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/sustainability-bond-guidelines-sbg/. Accessed January 20, 2024

International Capital Market Association (ICMA). (2023a). *Climate Transition Finance Handbook*. Retrieved from https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/climate-transition-finance-handbook/. Accessed January 20, 2024

International Capital Market Association (ICMA). (2023b). *Social Bond Principles (SBP)*. Retrieved from https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/social-bond-principles-sbp/. Accessed January 20, 2024

International Capital Market Association (ICMA). (2023c). *Sustainability-Linked Bond Principles (SLBP)*. Retrieved from https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/sustainability-linked-bond-principles-slbp/. Accessed January 20, 2024

Jakubik, P., & Uguz, S. (2021). Impact of green bond policies on insurers: Evidence from the European equity market. *Journal of Economics and Finance*, *45*(2), 381–393. https://doi.org/10.1007/s12197-020-09534-4.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X.

Larcker, D. F., & Watts, E. M. (2020). Where's the greenium? *Journal of Accounting and Economics*, *69*(2), 101312. https://doi.org/10.1016/j.jacceco.2020.101312.

Lebelle, M., Lajili Jarjir, S., & Sassi, S. (2020). Corporate green bond issuances: An international evidence. *Journal of Risk and Financial Management*, *13*(2), 25. https://doi.org/10.3390/jrfm13020025.

Li, Y., Gong, M., Zhang, X.-Y., & Koh, L. (2018). The impact of environmental, social, and governance disclosure on firm value: The role of CEO power. *The British Accounting Review*, *50*(1), 60–75. https://doi.org/10.1016/j.bar.2017.09.007.

Liu, N., Liu, C., Da, B., Zhang, T., & Guan, F. (2021). Dependence and risk spillovers between green bonds and clean energy markets. *Journal of Cleaner Production*, *279*, 123595. https://doi.org/10.1016/j.jclepro.2020.123595.

MacAskill, S., Roca, E., Liu, B., Stewart, R. A., & Sahin, O. (2020). Is there a green premium in the green bond market? Systematic literature review revealing premium determinants. *Journal of Cleaner Production*, *280*(2), 124491. https://doi.org/10.1016/j.jclepro.2020.124491.

Masulis, R. W., & Reza, S. W. (2015). Agency problems of corporate philanthropy. *Review of Financial Studies*, *28*(2), 592–636. https://doi.org/10.1093/rfs/hhu082.

Ministry of the Environment of Japan. (2022). *Green Bond and Sustainability-Linked Bond Guidelines*. Retrieved from https://greenfinanceportal.env.go.jp/en/bond/guideline/guideline.html. Accessed January 20, 2024

Mitsubishi Materials Corporation. (2023). *Established the transition-linked finance framework-promoting our efforts to achieve carbon neutrality by FY2046*. Retrieved from https://www.mmc.co.jp/corporate/en/news/2023/news20231101.html. Accessed January 20, 2024

Nanayakkara, M., & Colombage, S. (2019). Do investors in green bond market pay a premium? Global evidence. *Applied Economics*, *51*(40), 4425–4437. https://doi.org/10.1080/00036846.2019.1591611.

Orlitzky, M. (2001). Does firm size comfound the relationship between corporate social performance and firm financial performance? *Journal of Business Ethics*, *33*(2), 167–180. https://doi.org/10.1023/a:1017516826427.

Partridge, C., & Medda, F. R. (2020). The evolution of pricing performance of green municipal bonds. *Journal of Sustainable Finance & Investment*, *10*(1), 1–21. https://doi.org/10.1080/20430795.2019.1661187.

Rafique, M. Z., Fareed, Z., Ferraz, D., Ikram, M., & Huang, S. (2022). Exploring the heterogenous impacts of environmental taxes on environmental footprints: An

empirical assessment from developed economies. *Energy*, *238*, 121753. https://doi.org/10.1016/j.energy.2021.121753.

Reboredo, J. C. (2018). Green bond and financial markets: Co-movement, diversification and price spillover effects. *Energy Economics*, *74*, 38–50. https://doi.org/10.1016/j.eneco.2018.05.030.

Reboredo, J. C., & Ugolini, A. (2020). Price connectedness between green bond and financial markets. *Economic Modelling*, *88*, 25–38. https://doi.org/10.1016/j.econmod.2019.09.004.

Renneboog, L., Ter Horst, J., & Zhang, C. (2008). Socially responsible investments: Institutional aspects, performance, and investor behavior. *Journal of Banking & Finance*, *32*(9), 1723–1742. https://doi.org/10.1016/j.jbankfin.2007.12.039.

Roslen, S. N. M., Yee, L. S., & Ibrahim, S. A. B. (2017). Green bond and shareholders' wealth: A multi-country event study. *International Journal of Globalization and Small Business*, *9*(1), 61. https://doi.org/10.1504/ijgsb.2017.084701.

Serafeim, G., & Yoon, A. (2023). Stock price reactions to ESG news: The role of ESG ratings and disagreement. *Review of Accounting Studies*, *28*, 1500–1530. https://doi.org/10.1007/s11142-022-09675-3.

Sharfman, M. P., & Fernando, C. S. (2008). Environmental risk management and the cost of capital. *Strategic Management Journal*, *29*(6), 569–592. https://doi.org/10.1002/smj.678.

Tang, D. Y., & Zhang, Y. (2020). Do shareholders benefit from green bonds? *Journal of Corporate Finance*, *61*, 101427. https://doi.org/10.1016/j.jcorpfin.2018.12.001.

Tang, Y., Wang, B., Pan, N., & Li, Z. (2023). The impact of environmental information disclosure on the cost of green bond: Evidence from China. *Energy Economics*, *126*, 107008. https://doi.org/10.1016/j.eneco.2023.107008.

Tolliver, C., Keeley, A. R., & Managi, S. (2020). Drivers of green bond market growth: The importance of nationally determined contributions to the Paris Agreement and implications for sustainability. *Journal of Cleaner Production*, *244*, 118643. https://doi.org/10.1016/j.jclepro.2019.118643.

Tsai, H.-J., & Wu, Y. (2022). Changes in corporate social responsibility and stock performance. *Journal of Business Ethics*, *178*, 735–755. https://doi.org/10.1007/s10551-021-04772-w.

Wang, J., Chen, X., Li, X., Yu, J., & Zhong, R. (2020). The market reaction to green bond issuance: Evidence from China. *Pacific-Basin Finance Journal*, *60*, 101294. https://doi.org/10.1016/j.pacfin.2020.101294.

Wang, S., & Wang, D. (2022). Exploring the relationship between ESG performance and green bond issuance. *Frontiers in Public Health*, *10*. https://doi.org/10.3389/fpubh.2022.897577.

Wang, T., Liu, X., & Wang, H. (2022). Green bonds, financing constraints, and green innovation. *Journal of Cleaner Production*, *381*(1), 135134. https://doi.org/10.1016/j.jclepro.2022.135134.

Yoon, B., Lee, J., & Byun, R. (2018). Does ESG performance enhance firm value? Evidence from Korea. *Sustainability*, *10*(10), 3635. https://doi.org/10.3390/su10103635.

Zerbib, O. D. (2019). The effect of pro-environmental preferences on bond prices: Evidence from green bonds. *Journal of Banking & Finance*, *98*, 39–60. https://doi.org/10.1016/j.jbankfin.2018.10.012.

Zhang, Y., Li, Y., & Chen, X. (2024). Does green bond issuance affect stock price crash risk? Evidence from China. *Finance Research Letters*, *60*, 104908–104908. https://doi.org/10.1016/j.frl.2023.104908.