BI Norwegian Business School - campus Oslo

GRA 19703

Master Thesis

Thesis Master of Science

Lending for Sustainability

Navn:	YUJIE LENG, Ha Tuyet Nguyen

Start:	15.01.2021 09.00
Finish:	01.07.2021 12.00

Lending for Sustainability

Master Thesis

Ha Tuyet Nguyen and **Yujie Leng**

MSc in Finance

Supervisor: Tatyana Marchuk

Oslo, June 30, 2021

ABSTRACT

This thesis aims to investigate the relationship between shareholder wealth and sustainable loans, which are new instruments to finance ESG-friendly activities in the context of a growing public consciousness about sustainability. Using short-term event study methodology, we observe a significantly negative market reaction to sustainable loan issuance announcements from 2017 to 2020, suggesting that equity investors perceive that the costs of sustainable loan issuance outweigh any benefits. The price decline is larger for borrowers after the market crash caused by the COVID-19 pandemic, while the decline is smaller when public attention towards sustainability increases. However, we find that buy-and-hold abnormal returns measured against a portfolio of control firms do not differ significantly from zero in an up-to-six-month basis following issuance, suggesting no significant effect of sustainable loan issuance on shareholder wealth in the long run.

Keywords: ESG, sustainable lending, sustainable finance, sustainable loans, shareholder wealth, event study, buy-and-hold abnormal return

Acknowledgements

We would like to thank many people that have contributed directly or indirectly to our thesis. Firstly, we are grateful to have Professor Tatyana Marchuk as our supervisor. Her guidance and continuous feedback have been valuable and helpful; without it, we would not have finished our thesis on time. Secondly, a special thanks to our families for their unconditional support; it was a tremendous strength for us, especially during the COVID-19 pandemic when we both live away from home. Thirdly, we would like to thank Librarian Sigrid Noer Gimse and our friend Linh Tran for helpful advice on accessing the Refinitive database. In addition, we appreciate all the responses from several researchers that we reached out to, which helped us better understand the problems. Finally, we want to thank ourselves for finishing our two-year MSc program despite all of the physical and mental struggles.

Contents

List of Abbreviation

The following table describes the significance of various abbreviations and acronyms used throughout the thesis. The page on which each one is defined or first used is also given.

Abbreviation	Meaning	Page
BHAR	Buy-and-hold Abnormal Return	3
CAAR	Cumulative Average Abnormal Return	2
CAR	Cumulative Abnormal Return	4
ESG	Environmental, Social, and Governance	1
GHG	Greenhouse Gas	20
GL	Green Loan	12
GSV	Google Search Volume	32
NAICS	North American Industry Classification System	16
OLS	Ordinary Least Square	22
SLL	Sustainability-linked Loan	12
SPT	Sustainability Performance Target	12
VIF	Variance Inflaion Factor	37

List of Figures

List of Tables

1 Introduction

Since the adoption of the UN 2030 Agenda for Sustainable Development and the Paris Agreement, an increasing number of corporations strive to integrate a wide range of Environmental, Social, and Governance (ESG) factors into their business models through the use of sustainable lending. Covering the issuance of green loans and sustainability-linked loans, sustainable lending appears as an innovative form of sustainable debt, which not only helps the transition to a more resource-efficient and circular economy but also supports borrowers' individual sustainable development. This new market is a response to the growing demand of both lenders and borrowers for financial investments that bring sustainability and economic gains. Prior to 2017, the sustainable loan market was relatively small, with total issuances only about US$50B (approx. EUR 41B) (Refinitiv LPC, 2021). The launching of the Green Loan Principles in 2018 and the Sustainability-linked Loan Principles in 2019 by the Loan Market Association to establish guidelines for a loan to be labeled as sustainable have further strengthened the emergence and transparency of sustainable loans. Since then, the market for sustainable lending has expanded extraordinarily. Despite representing less than 20% of the sustainable debt market, global sustainable loans' aggregate issuance jumps four-fold to US$199B (approx. EUR 163B) in 2020 compared to 2017 (Refinitiv LPC, 2021). The sustainable lending market is expected to grow steadily in the future.

With this trend, a natural question is whether the issuance of sustainable loans translates into greater shareholder wealth. Corporate investments in ESG-friendly activities have traditionally been considered as self-interested behavior by individual managers, creating an excess cost imposed upon shareholders (e.g., Friedman, 1970; Fama, 1980; Jensen, 2001). Consequently, this perspective implies that higher commitment to

sustainability is a value-decreasing exercise for shareholders. In contrast, others have argued that ESG engagements could generate greater value for firms as well as shareholders, as improving ESG performance could help to increase the intrinsic value of all stakeholder relationships (e.g., Freeman, 1984; Donaldson & Preston, 1995; Jamali, 2008). Surprisingly, given that bank loans have a significant advantage over corporate bond financing (David & Vassil, 2003), we know very little about this new financial instrument. Previous literature has attempted to study the green bond, which is another important sustainable debt tool whose proceeds are committed to environmentally friendly projects (i.e., Tang & Zhang, 2020; Wang et al., 2020; Flammer, 2021). Compared to green bonds, sustainable loans are more versatile tools. The loan proceeds can either be used for the general corporate purpose where margins are tied to ESG targets (i.e., sustainability-linked loans) or finance environmentally and socially economic activities (i.e., green loans). Motivated by a gap in research on sustainable loans, our thesis, therefore, aims to be the first of those to investigate the fundamental question: **How do sustainable loan issuances affect shareholder wealth?**

In this study, we conduct our investigation using a sample of 124 loan announcements for 22 countries over the period 2017-2020 and estimate the short-term market reaction to sustainable loan issuance using an event study approach. We find that sustainable loan borrowers experience a significantly negative cumulative average abnormal return (CAAR) of -0.793%. Furthermore, the CAARs are more negative for loans issued in the European countries, new loans, and non-certified loans. Thus, it seems that investors interpret borrowing sustainable loans as incurring considerable costs on the firm, leading to a decline in shareholder wealth in short run. In addition, we also find that the announcement abnormal returns are more negative for loans issued after the COVID-19 market crash in 2020. This implies that

sustainability does not immunize against irresistible external shocks, further supporting the finding of Demers et al. (2021) that ESG offers no positive explanatory power for returns during the COVID-19 market crisis. However, the stock returns of borrowers react less negatively to sustainable loan issuance when public attention towards climate change increases.

We also examine the long-term stock returns following the issuance of sustainable loans. To obtain a benchmark return of the control group, we apply a matching methodology. In particular, we match each sustainable loan borrower to a normal loan borrower in the same country, industry, and year preceding the issuance based on several covariates. This procedure ensures that we have the comparison group most resembling our sample firms before the event. Unlike the significantly negative short-term market reaction, the long-term stock returns after sustainable loan issuance show no significant difference compared to their matched peers, as we fail to find any pattern of the buy-and-hold abnormal returns (BHARs) for up to six months. The result indicates that sustainable loan issuance has no impact on shareholder wealth. This finding could be explained as a result of the limited research period in our thesis, which is shorter than the typical long maturity of several years of the issued sustainable loans. Another explanation comes with the stricter ESG regulation that becomes a widely accepted norm for all entities. When norms come into effect, shareholders will no longer be affected by corporate decisions regarding ESG-enhancing activities. Reflecting that, the short-term result shows investors' concerns about the actual impact of sustainable loans on firm improvements.

Our thesis might have several important implications for the literature. The first contribution is to provide negative short-run event study results on the shareholder valuation of sustainable loan issuances, showing evidence that this ESG engagement is costly to shareholder value. Companies and lenders

might find our negative result worthwhile for the future adjustment of the loan contract designs as well as the framework to pursue long-term objectives. Secondly, this thesis also contributes to the literature of ESG influence on firm value by being one of the first (to our knowledge) to empirically examine the fast-growing sustainable lending market. Finally, our contribution is not limited to only sustainable lending, as our work may be related to the growing literature on how shareholders react to new ESG information.

The remainder of this research is organized as follows. In Section 2, the existing literature on the topics of market reaction to sustainability and sustainable debt is reviewed. After reviewing the prior literature, we discuss the related rationales and develop our hypotheses in Section 3. Section 4 provides a description of sustainable loan characteristics, the sampling procedure, and the data description. Section 5 describes our event study and reports results from the cross-sectional analysis of cumulative abnormal returns (CARs). Section 6 discusses the empirical finding of the long-term abnormal returns after the issuance, and Section 7 summarizes our research and puts forward further research questions.

2 Literature Review

The rise of sustainable lending garners the attention of equity investors, inducing researchers to explore the relationship between sustainable lending and shareholder wealth. Due to the lack of previous research directly targeting sustainable loan issuance, we discuss the two main strands of the literature: private bank loan issuance and shareholder wealth, and ESG engagement and shareholder wealth.

2.1 Bank Financing and Shareholder Wealth

Bank lending is considered a special type of debt, as banks have an advantage in monitoring, screening, and liquidity transformation because of their ongoing relationship with the borrowers (Diamond, 1991). A number of studies provide evidence that the stock market reacts positively to bank loan issuance, suggesting that bank loan issuance increases shareholder wealth (Billett et al., 1995; Preece & Mullineaux, 1996; Lee & Sharpe, 2008). Billett et al. (2006) conclude that institutional lenders could enhance a borrower's value by reducing information asymmetry and monitoring firm performance. The positive market reaction also suggests that the borrower-specific information adds incremental value, which exceeds the potential costs brought by the relationship loan (Boot & Thakor, 2000). Another explanation for the positive abnormal return is that the capability to renegotiate the bank loan agreement complements the monitoring function to add value to borrowers (Preece & Mullineaux, 1996).

However, the positive abnormal returns associated with bank loans are proved to be weakening after the 1980s. Fields et al. (2006) find from a sample of US firms that the positive short-run abnormal return around loan issuance declines from the 1980-89 period to the 1990-99 period and diminishes even further in the 2000-03 period. In line with the diminishing trend, Marshall et al. (2019) find that the abnormal return of bank loan issuance announcements decreases significantly after the 2008 financial crisis, and the higher abnormal returns compared to other debt sources no longer presents. The special nature of bank loans seems to disappear.

2.2 ESG Engagement and Shareholder Wealth

The question of whether ESG engagement increases the firm value has been of vital interest for both corporate managers and investors in recent years.

The substantial debate starts with the publishing of Friedman (1970)'s shareholder theory, which holds the view that management should take as its only responsibility the ethical maximization of shareholders' profits. Thus, the shareholder theory simply takes ESG initiatives as a drain on the firm value as managers can opportunistically use corporate resources to enhance their utility. This view is further supported by Jensen (2001), who argues that managers only need to pursue shareholder wealth maximization and regard ESG-friendly activities as additional and unnecessary costs at the expense of shareholder. Sustainable lending is, therefore, considered as a value-decreasing activity and contrary to the objective of increasing shareholder wealth.

The stakeholder theory led by Freeman (1984), on the other hand, emphasizes the importance of considering the interests of all stakeholders. In depth, he explains that applying the stakeholder theory in business enhances the firm value by driving stakeholders' interests going in the same direction, creating relationships among all stakeholders. Stakeholders are defined to cover not only the equity shareholders but also employees, customers, suppliers, communities, governments, financiers, bondholders, and banks as a whole, all of which concurrently contribute to the success of any organization. Donaldson and Preston (1995) further argue that the interests of all stakeholders have intrinsic value contributing to the firm, so ESG activities which enhance the relationship of all stakeholders can increase the firm value as well as shareholder value. Through the issuance of sustainable loans, companies consider their commitments to sustainability, such as improving employee satisfaction and reducing carbon footprint, instead of just the interests of shareholders when making investment decisions, which is perceived to enhance the firm value and shareholder wealth generally.

Based on the two theories, prior research has revealed mixed results regarding the positive ESG events. In early arguments, the research on ESG supports the shareholder theory that ESG engagement destroys shareholder value due to the additional costs of fulfilling the ESG criteria. Earlier studies test the announcement effects of various positive ESG activities using event study methodology. In the short run, Oberndorfer et al. (2013) find a strong negative impact on returns when firms are included in an ESG index, indicating that shareholders are not financially rewarded in high ESG performance firms. Fisher-Vanden and Thorburn (2011) also report significant losses in the firms' stock price due to the announcement of voluntary environmental initiatives. They further show that firms with more inadequate corporate governance structures have greater discretion to make investment decisions out of their own best interests, which induces further declining stock prices. Krüger (2015) only finds a weak significantly negative response to positive sustainability events, interpreting this as the result of agency cost. The negative relation indicates that shareholders view commitments towards sustainability as harmful to their wealth.

Compared to the research with negative results, a large body of studies report a positive relationship between ESG activities and shareholders' wealth, supporting the stakeholder theory. For the short-term effect, several papers have examined the stock price reactions to public ESG disclosure (e.g., Al-Tuwaijri et al., 2004; Fatemi et al., 2018; Ng & Rezaee, 2020), ESG rating or certification (e.g., Chollet & Cellier, 2011), and ESG stock index redefinition like inclusion or exclusion (e.g., Becchetti et al., 2012; Ramchander et al., 2012). These papers have proved that ESG engagement creates value for shareholders, although Flammer (2012) reveals that the short-term market prosperity has been diminishing over the years. By testing the announcement returns of publicly traded companies in the US from 1980 to 2009, Flammer (2012) observes a decreasing trend of positive

announcement returns on ESG-friendly news, as sustainability becomes a more widely accepted norm. Despite the decreasing short-term positive relation, Edmans (2011) and Lins et al. (2017) show that firms with high ESG profiles have higher stock returns in the long run.

In addition, Palmer et al. (1995) develop an offset theory stating that the investment cost would offset any benefits from improvements in sustainability. In other words, positive ESG events could have no impact on shareholder wealth. Capelle-Blancard and Petit (2019) support this theory with the result that no impact of positive ESG news on stock returns when extending the event sample to include both extreme and ordinary events. Jacobs et al. (2010) also report insignificant abnormal returns for firms with announcements about self-reported corporate effort towards ESG and recognition granted by third-parties for environmental performance.

In the light of the COVID-19 pandemic and the long-lasting subsequent lockdowns, there is now some concern about the relation between sustainability and the stock market reaction. As an unexpected and exogenous shock that closely relates to sustainability, the COVID-19 crisis is used by Albuquerque et al. (2020) to test whether pre-existing ESG conditions affect firms' ability to endure the market crash caused by this crisis. Their paper concludes that stocks with higher ESG ratings have significantly higher returns during the first quarter of 2020. In contrast, Demers et al. (2021) find no such immunization effect for ESG stocks with the sample data of both the first quarter and the whole of 2020. Bae et al. (2021)'s finding is consistent with the result of Demers et al. (2021), stating that high ESG performance in pre-crisis time is not effective in preventing shareholder loss.

As the discussed results have not reached a consolidated conclusion, it remains an open question whether sustainability improves shareholder value. Integrating the sustainability characteristics to bank loans, the relation

between sustainable loan issuance and shareholder value is worth exploring, especially after the COVID-19 crisis.

3 Testable Hypotheses

Linking the existing literature to our research question mentioned in Section 1, we develop the hypotheses below.

The sustainable loan issuance news contains two pieces of information that might affect shareholder value: bank loan issue and firm's commitment towards sustainability. Previous research reports that market reaction to private bank loan issuances is normally positive due to the reduction of information asymmetry brought by close monitoring and screening of borrowers. Even though the specialty of bank loans is documented to diminish over time (Fields et al., 2006), we still expect that information generated by the bank loan issuance affects shareholder perception. On the other hand, a growing body of literature has shown that the stock market reacts differently to positive ESG news. If ESG engagement activity conveys new information about a firm to market investors, it could be viewed as either value-destroying or value-enhancing, depending on whether shareholders follow Friedman (1970)'s view of shareholder theory or Freeman (1984)'s stakeholder view of the corporation (described in Section 2.2). Thus, we first put forward the following hypotheses.

H1a: The stock market responds positively to sustainable loan issuance in the short run.

H1b: The stock market responds negatively to sustainable loan issuance in the short run.

A related question is whether sustainability affects shareholder wealth in the long run. Since the short-term market reaction is mainly based on the market efficiency hypothesis, the results are not always reliable when the

efficient market theory cannot be applied well in reality. ESG actions often produce intangible assets whose value is not revealed to the markets until they start to generate visible outcomes a long time later (Dorfleitner et al., 2018). According to Edmans (2011), the long-term abnormal returns are more related to shareholder wealth as they capture all the channels through which the intangible sustainability commitment and the related tangible outcomes, such as new products or investment, affect shareholders. Institutional investors, taking a large portion of ownership in publicly traded firms, are often likely to choose sustainability-oriented portfolio firms with the objective to create long-term value. Therefore, we propose the following hypotheses.

H2a: The stock market responds positively to sustainable loan issuance in the long run.

H2b: The stock market responds negatively to sustainable loan issuance in the long run.

Despite the severe stock market collapses due to the lockdowns following the COVID-19 pandemic, the issuance of sustainable loans is still growing rapidly in the full year 2020 (Refinitiv LPC, 2021). The sharp increase of governments' and investors' attention to ESG considerations led by the pandemic is estimated to make the market response to ESG actions more salient during the crisis period. Compared to normal loan issuance, sustainable loan issuance is expected to convey to the public that the borrowers are engaging in sustainability and caring for the broader interests of stakeholders (Bae et al., 2021). Therefore, if sustainable lending is proven to increase shareholder value, supporting the stakeholder theory, the relationship among all stakeholders is expected to improve due to the strengthening alignment of ESG purpose, further benefiting shareholder wealth. On the other hand, once the shareholder value decreases following the shareholder theory, the costs to shareholders due to the increasing ESG

manifestations brought by the crisis are expected to lead to a more negative result. We put forward the following hypothesis.

H3: Shareholder wealth response is more salient to sustainable loan issuance after the market crash caused by the COVID-19 pandemic.

Addressing ESG issues requires joint efforts from both entities and the public. Many researchers report that sustainability has received increasing attention from the public over the past years, mainly reflected in the increase in online searches and media coverage (e.g., Fisher-Vanden & Thorburn, 2011; Flammer, 2012; Capelle-Blancard & Petit, 2019; El Ouadghiri et al., 2021). The increase in public attention is likely to cause attitude changes in investors' awareness of ESG issues, driving traditional self-interested shareholders to favor ESG activities (El Ouadghiri et al., 2021). Furthermore, public attention, which exerts pressure for firms to become sustainable, sets the institutional norm of ESG, forcing firms to care about ESG issues during operating and investing. Intuitively, the more that sustainability becomes a norm, the less reactive shareholders are to ESG-friendly news. In our case, besides the norm effect that the public attention brings, the convergence of shareholders' and the public's attitudes towards ESG aligns the interests of all stakeholders, reducing the potential agency problem mentioned in the shareholder theory. Hence, the relation between sustainable loan issuance and the stock market is expected to improve with the increasing public attention towards sustainability.

H4: An increase of public attention towards sustainability drives the stock price responses to sustainable loan issuance.

4 Sample Selection and Data Description

4.1 Characteristics of Sustainable Loans

Sustainable loans generally refer to a type of credit that takes account of ESG considerations. The two types of approaches used for structuring sustainable loans are green loans (GLs) and sustainability-linked loans (SLLs). GLs are generally utilized to "finance or re-finance, in whole or in part, new and/or existing eligible Green Projects" (Loan Market Association, 2018, p. 2) . Given that format, GL borrowers are limited to "green" sectors with precise definitions of green assets and projects. Unlike GLs, SLLs help to "incentivize the borrower's achievement of ambitious, predetermined sustainability performance objectives" (Loan Market Association, 2019, p. 2), and SLL borrowers could be rewarded with a lower interest rate if "sustainability performance targets" ("SPTs") are met. The SPTs can be either internal targets (e.g., CO_2 intensity reduction, energy efficiency improvements, and employee training) or sustainability ratings from an external agency (e.g., Sustainalytics, RobecoSAM, and Vigeo Eiris). Hence, the involvement of SPTs allows all borrowers that want to improve sustainability profiles to access sustainable lending regardless of industry.

European sustainable lending market is differentiated from all other regions in the world. According to Refinitiv LPC's Sustainable Finance Review 2021, the EU dominated the sustainable loan market, taking up around 64% of the market in 2020. European countries are more transparent than all other countries by providing more standardized sustainability guidelines regarding non-financial disclosure and sustainable investing. For example, introduced by the European Commission in 2019, the European Green Deal is an overarching framework to help the EU achieve climate neutrality by 2050. A vital component of the Green Deal is the first-ever proposed "Climate Law", which is passed on 21^{st} April in 2021, embedding a

legal commitment to strengthen the ESG performance disclosure. Following the European Green Deal, the EU also adopts several sustainable finance regulations such as the EU Taxonomy, the EU Action Plan on Sustainable Finance, and the EU Green Bond Standard. These steps establish the foundation of the EU's work to increase transparency and help entities access sustainable financing. Following Europe, the Americas and Asia occupy the second and third positions in this market (Refinitiv LPC, 2021). Besides climate change, poverty is another main issue that Asian countries want to address through sustainable loans. With the good practice solutions to overcome these urgent challenges, Asia shows a strong momentum towards the development of sustainable loan issuance (Cruz, 2020).

Despite the innovative characteristics and the huge surge in issuance over the past few years, there are still several concerns related to the inadequate sustainable loan standards. The first and the biggest concern is the potential presence of sustainability-washing, which gives a misleading or inflated impression about firms' commitment to ESG. As there are no restrictions and tracking methods on the use of proceeds for SLLs, the borrowers may invest in projects with no sustainable impacts. For example, firms can build a high ESG profile by investing the proceeds in transferring the business with high emission to their suppliers. While the public pays attention to the ESG performance of the firm itself, limited attention is paid to the complete production process in the complex supply chains, whose average level of carbon emissions is more than five times the direct emission (Carbon Disclosure Project, 2019). Seizing this loophole, firms can use such transfer to obtain high ESG ratings without actually improving ESG performance. Furthermore, sustainability-washing also occurs with the lack of standard design of SPTs, or transparent and effective disclosure requirements. At the moment, the SPTs set is unique to the individual borrowers and often depends on the firm's industry, business model, or

operating environment, limiting its comparability of one set to another (S&P Global, 2021). The SPTs may also be too general and not demonstrate a significant difference compared to borrowers' business-as-usual strategy. A S&P Global Ratings Report in September 2019 stresses concerns about "self-reported and unaudited performance data as well as self-policed and self-determined objectives for sustainability labeling" (Wilkins & Bendersky, 2019, p. 4), indicating that misreporting practices could happen with the current reporting system. Although Loan Market Association encourages borrowers to have their performance reporting certified/reviewed by external reviewers (Loan Market Association, 2018, 2019), the same problem may still exist. Because of an absence of standardizations of the measurement procedures, each ESG assessment provider has a unique methodology for assigning company-specific rankings, which leads to disagreement among ESG ratings from different providers (Berg et al., 2019).

Another concern comes with the financial penalty in the event of breaching SPTs or GLs' provision. When fail to comply with GLs provision, the loan might cease to be considered green, and it may be appropriate for such a breach to constitute an event of default. For SLLs, breaching SPTs could lead to economic consequences of higher interest rates though it may not be assessed as a default. Although the penalty for missing the predetermined targets is suggested to move closer to where a ratings downgrade penalty would be, it varies by country and industry and is often considered too low to matter (Asgari, 2019). In the meantime, the reward in the case of achieving targets is only as little as a 2.5-3.0bp decrease in yield (Irwin et al., 2020). Believing that the rewards or penalties to borrowers are fairly modest, this "carrot and stick" approach may lead to a concern that sustainable loan issuance cannot create sufficient incentive for entities to make significant ESG performance improvements over the lending period.

4.2 Sample Selection

Data on global sustainable loans are obtained from Refinitiv. We begin with an initial sample of firms that borrowed sustainability-related loans using a search with the keywords "sustainable loan" and "green loan" from 2017 to 2020. The data include information about each loan, including the borrower, lender, market of issuance, tranche amount, issue date, and tenor. Concerning the accuracy of the search results, we search on Factiva, Google Finance news, and firms' annual and sustainability reports to identify an exact type and announcement date for sustainable loans. To be included in our sample, the news has to contain detailed information about sustainable loans. We then eliminate all firms that were privately held, borrowed sustainable loans before IPO, or delisted during the sample period. We further search for all articles, news, and press releases from Factiva on the day of the announcement and the surrounding days (i.e., the event window) to find confounding news that could potentially impact the stock price, including earnings announcements, M&A, stock repurchases or issuances, executive or credit rating changes, and other major corporate news.

In the next step, we collect adjusted daily stock prices and total returns from Refinitiv, accounting for price changes brought about by dividend distribution and stock splits. Thinly traded securities could result in the market model's estimated of β being biased and inconsistent (Brown & Warner, 1985), so we drop all stocks with available stock prices in less than 50% in the estimation window. Finally, following the methodology by Campbell et al. (2010), we collect each country's leading stock market index returns as proxies for the market returns, giving us 22 different value-weighted indices corresponding to the 22 different countries in our sample. The sample selection procedure yields a final sample of 124 announcements over 2017-2020 relating to 109 unique firms.

4.3 Descriptive Analysis at the Loan Level

Table 1 shows the annual distribution of loan announcements in the sample from 2017 to 2020. In 2017, there are only 5 sustainable loans issued (corresponding to EUR 3.218B); however, 50 loans are issued in 2019 (EUR 44.305B).[1] Sustainable loans have experienced rapid growth over the past years and are expected to become a popular choice among firms.

Table 1: Sustainable Loan Description over Time

The table reports the total issuance amount (EUR in Billion) as well as the number of publicly issued corporate sustainable loans in our sample on an annual basis from 2017 to 2020.

Year	Amount (Bn EUR)	# Loans
2017	3.218	5
2018	19.545	19
2019	44.305	50
2020	31.417	50

Table 2 reports the distribution of loans by country. As shown in this table, France, Singapore, and Japan are the countries that issued the highest number of sustainable loans, while Spain, France, and Germany are the largest borrowers in EUR terms.

Table 3 provides a distribution of sustainable loans by the two-digit North American Industry Classification System (NAICS) code. The majority of sustainable loans are issued in manufacturing, real estate and rental and leasing, utilities, and construction sectors.

[1] We convert all the tranche amounts to EUR to facilitate comparisons because most of the loans were issued in EUR. Many loans contain several tranches; thus, we combine them in one single loan and use a weighted average to calculate tenor, following Flammer (2021).

Table 2: Sustainable Loan Description by Country/Territory

The table reports the total issuance amount (EUR in Billion) as well as the number of publicly issued corporate sustainable loans in our sample by country/territory from 2017 to 2020.

Country/Territory	Amount (Bn EUR)	# Loans
Australia	0.248	1
Austria	2.090	4
Belgium	0.650	1
Finland	6.050	10
France	21.197	14
Germany	13.392	11
Hong Kong	1.078	6
Republic of Ireland	2.700	2
Italy	4.363	10
Japan	1.407	13
Netherlands	10.700	6
New Zealand	0.058	2
Norway	3.440	2
Poland	0.110	1
Portugal	0.100	1
Singapore	4.997	14
Spain	11.806	10
Sweden	3.000	2
Switzerland	2.850	4
Taiwan	0.150	2
United Kingdom	2.137	3
United States	5.964	5

Table 3: Sustainable Loan Description by Sector

The table reports the total issuance amount (EUR in Billion) as well as the number of publicly issued corporate sustainable loans in our sample from 2017 to 2020. Sectors are partitioned according to the two-digit NAICS code.

Sector	Amount (Bn EUR)	# Loans
Accommodation and Food Services	1.635	3
Administrative and Support and Waste Management and Remediation Services	0.750	2
Agriculture, Forestry, Fishing, and Hunting	0.029	1
Construction	10.731	14
Finance and Insurance	2.641	4
Information	2.750	2
Manufacturing	45.546	50
Mining, Quarrying, and Oil and Gas Extraction	2.905	1
Professional, Scientific, and Technical Services	0.900	2
Real Estate and Rental and Leasing	6.521	14
Retail Trade	4.248	5
Transportation and Warehousing	2.203	5
Utilities	16.320	19
Wholesale Trade	1.305	2

We present summary characteristics for sustainable loan issues in Column (1) of Table 4. In Column (2), we compare sustainable loans with normal loans borrowed by the public firms in the same two-digit NAICS industry code, country, and year as sample firms.[2] As can be seen, the average amount per sustainable loan is approximately EUR 794.23M, which accounts for 7.5% of the book value of the total assets as of the end of the preceding fiscal year, 5.50% of the firm's market value, and 34% of the existing debt. Additionally, the average tenor is 56 months. In contrast, the normal loan issue is slightly lower than sustainable loan issue, as the average amount is EUR 662.07M, with an average tenor of 50 months. Nonetheless, the relative average normal loan raised by industry peers is higher than the sustainable loan, as it accounts for 14.4% of the book value of the total assets as of the end of the preceding fiscal year, 10.6% of the firm's market value, and, especially, 4.773 times the existing debt. In Column (3), we report the characteristics for all normal loans issued in the same two-digit NAICS industry code, and country over 2017-2020, which are similar to the result reported in Column (2).

Table 4: Summary Statistics at the Loan Level

The table reports summary statistics for all sustainable loans in our sample (Column (1)) and the normal loans borrowed by the peer firms in the same issuance year as sustainable loans (Column (2)) and during the full sample period from 2017 to 2020 (Column (3)). Within each column, we report the number of observations and the average value for each characteristic. The *Amount Issued* refers to the amount of issued loans in million EUR; *Tenor* refers to the tenor of the issued loans in month; *Amount/Total Asset*, *Amount/Market Value*, and *Amount/Total Debt* refer to the ratios that issued loan amount to total asset, market value, and total debt of the borrowers in the fiscal year preceding the issuance, respectively.

	(1) ESG Loans		**(2)** Normal Loans (Same year)		**(3)** Normal Loans (Same period)	
	N	Mean	N	Mean	N	Mean
Amount Issue (million EUR)	124	794.230	2418	662.073	4569	674.654
Tenor	124	56.041	2418	50.005	4569	50.546
Amount/Total Asset	124	0.075	2418	0.144	4565	0.142
Amount/Market Value	124	0.055	2417	0.106	4560	0.102
Amount/Total Debt	124	0.340	2384	4.773	4507	3.435

[2]The normal loan data are downloaded from Refinitiv.

4.4 Descriptive Analysis at the Borrower Level

We collect data on the firms' financial characteristics from Refinitiv as follows. Firm size *(SIZE)* is the variable indicating the size of the firm, measured by the natural logarithm of the firm's total assets. Return on assets *(ROA)* is the ratio of net income after tax to the book value of total assets. Leverage *(LEVERAGE)* is measured by dividing a firm's total debt by its total assets. Liquidity *(LIQUIDITY)* is total cash and short-term investment scaled by total assets. Market-to-book ratio *(MBratio)* is the market value of equity plus the book value of total debt divided by total assets. Board size *(BOARDSIZE)* is the total number of directors serving on the board. Gender diversity *(FEMALE)* is the percentages of female directors present on the board of directors. All the variables are in the year prior to the announcement of sustainable loan issuances.

We collect the firm's ESG data from Refinitiv for the ESG performance of the firm in the year prior to the announcement. The Refinitiv ESG score measures the company's ESG performance-based publically reported data. ESG score is divided into three principal pillar scores: Environment Pillar Score *(E_SCORE)*, Social Pillar Score *(S_SCORE)*, and Governance Pillar Score *(G_SCORE)*. Firstly, the environment pillar includes emission category (emission, waste, biodiversity, and environmental management systems), innovation category (product innovation, green revenues/R&D/capex), and resource use category (water, energy, sustainable packaging, and environmental supply chain). Secondly, the governance pillar includes CSR strategy (CSR strategy, ESG reporting, and transparency), management category (structure and compensation), and shareholders category (shareholder rights and takeover defenses). Thirdly, the social pillar has community category, human rights, product responsibility (responsible marketing, product quality, and data privacy), and workforce (diversity and

inclusion, career development and training, working conditions, health, and safety). Additionally, Refinitiv applies industry and country benchmarks at the data point-scoring level to facilitate comparative analysis within peer groups (Refinitiv, 2021). The scores are normalized to percentages ranging between 0 and 100 as well as available in letter grades from D- to A+.

Our sample consists of 119 unique firm-year observations as several firms borrow multiple loans in the same year. In column (1) of Table 5, we report the descriptive statistics for several characteristics of borrowers in the fiscal year preceding loan announcement. In column (2), we compare sustainable loan borrowers with their industry peers. To be included in the comparison group, we only select public firms that borrow normal loans in the same two-digit NAICS industry code, country, and year as sample firms.

Panel A shows the financial characteristics of sample firms and their peers. As can be seen, the sustainable loan borrowers are typically larger and have higher cash holdings than other normal loan borrowers, while they have a similar leverage ratio, growth opportunities (market-to-book ratio), and profitability (ROA). The average sample firm has a firm size of about 22.945 (median 23.147), compared to 21.562 (median 21.495) for their rivals.

Panel B reports the ESG indicators of both groups. We obtain information on the greenhouse gas (GHG) emissions reduction goals from Refinitiv. The sample company plans to reach the emission target in an average of six years, approximately the same as its peers. However, the average goal is a 31.9% reduction in emissions, which is more ambitious than the average goal of 25.67% of their rival firms. Regarding ESG performance, borrowers of sustainable loans have higher average ESG scores than their respective rivals in all three pillars, especially in the Environmental pillar score with an average of 71.125 compared to 47.578 of their industry rivals. The panel also reveals that both groups have the same average board size of

about 11 people; however, the sample group has a higher percentage of female directors on board with an average of 27.6% compared to 17.1% of their peers.

Table 5: Summary Statistics at the Borrower Level

Panel A shows the statistics of the financial characteristics, while Panel B states the results of the ESG indicators. Column (1) provides summary statistics for sustainable loan borrowers in the fiscal year before the announcement. For each characteristic, the table reports the sample means and median (in parentheses). In column (2), the statistics show the average across normal loan borrowers in the same two-digit NAICS industry, country, and issuance year as the sample firms. Column (3) represents the p-value of the t-test for difference in means (p-value of the Wilcoxon signed-rank test in parentheses). *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively.

	N	Sustainable Loan Borrowers **(1)**	Normal Loan Borrowers **(2)**	P-value **(3)**
Panel A. Financial Characteristics				
SIZE	119	22.945	21.562	0.000***
		(23.147)	(21.495)	(0.000***)
LIQUIDITY	118	0.080	0.122	0.000***
		(0.072)	(0.097)	(0.000***)
LEVERAGE	119	0.313	0.295	0.205
		(0.311)	(0.284)	(0.162)
ROA	119	0.037	0.034	0.296
		(0.033)	(0.034)	(0.957)
MBRatio	119	1.539	1.794	0.583
		(1.288)	(1.280)	(0.537)
Panel B. ESG Indicators				
YEARS TO GHG TARGET	75	5.893	5.014	0.193
		(5.000)	(2.000)	(0.158)
GHG REDUCTION TARGET	67	31.900	25.671	0.043**
		(26.000)	(20.000)	(0.052*)
E_SCORE	99	71.125	47.518	0.000***
		(74.503)	(51.335)	(0.000***)
S_SCORE	99	71.730	52.319	0.000***
		(78.027)	(53.012)	(0.000***)
G_SCORE	99	58.704	52.707	0.009***
		(61.184)	(54.266)	(0.012**)
BOARDSIZE	101	10.950	10.955	0.990
		(11.000)	(11.000)	(0.906)
FEMALE	101	0.276	0.171	0.000***
		(0.286)	(0.167)	(0.000***)

5 Short-Term Impact on Shareholder Wealth

5.1 Market Reaction to the Sustainable Loan Issuances

5.1.1 Event Study Methodology

To examine the market reaction to sustainable loan issuances, we apply event study methodology. The assumption behind the event study is the efficient market hypothesis (Fama, 1998), which states that capital markets immediately reflect the available new information in the firm's stock price. Event study typically focuses on analyzing abnormal returns around the announcement date by adjusting the expected normal returns from actual stock returns. Thus, the abnormal stock returns are assumed to represent the unanticipated impact on the shareholder wealth from the event (McWilliams & Siegel, 1997), and we can understand the shareholders' perception of loan issuance under the sustainability concept. Furthermore, a short-term event study can reduce reverse causality bias, which may happen when examining the impact of ESG on firm performance.

Because our sample includes borrowers from 22 countries, we follow the multi-country event study methodology developed by Campbell et al. (2010) to account for the difference in the trading pattern of various markets. Hence, the market model is used to estimate benchmark return with country-leading market indices as proxies for market indices. Formally, the market model is estimated as:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}, \tag{1}$$

where R_{it} is the return of firm i on day t, R_{mt} is the daily return of the corresponding market index, and ϵ is the residual. The coefficients α_i and β_i are estimated by Ordinary Least Square (OLS) using daily return data in the estimation window, which should be short enough to capture recent price

movements and long enough to minimize the volatility of the daily returns (Strong, 1992). We, therefore, choose a commonly used preceding 200 trading-day estimation window of [-250, -50] akin to (Krüger, 2015).

Given the estimates from the market model, we then measure the sample abnormal returns of firm i on day t as follows:

$$AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}). \tag{2}$$

For the event window, the event period should be after the estimation window to prevent any variation that the event itself brings to the estimates (MacKinlay, 1997). The event study would be problematic with a short event window if the event's information is leaked or anticipated. In contrast, a long event window may lead to a biased estimate of the event's effect because of potential confounding events. Guided by Krüger (2015), we set the announcement date as event date (day 0) and analyze a common short-horizon 11-day event window of [-5, +5] to capture the majority of information leakage prior to the event and slower dissemination after the event. For the full sample data, we extend several time intervals prior to the event window ([-20, -11] and [-10, -6]) and after the event window ([6, 10] and [11, 20]) to check for any run-up effect to stock price within a longer period of time.

The cumulative abnormal return (CAR) for an individual firm i is the aggregate of all abnormal returns within the event window $[T_1, T_2]$ interval:

$$CAR_i(T_1, T_2) = \sum_{t=T_1}^{T_2} AR_{it}. \tag{3}$$

Finally, the estimated cumulative average abnormal return (CAAR) across the 124 sample firms captures the stock market reaction and is calculated as:

$$CAAR(T_1, T_2) = \frac{1}{N} \sum_{i=1}^{N} CAR_i(T_1, T_2). \tag{4}$$

5.1.2 Event Study Tests

Before testing the statistical significance of CAAR, potential problems embedded in the data set need to be addressed. Firstly, a cross-sectional correlation problem arises when events for multiple firms happen on the same day (Kolari & Pynnönen, 2011). More specifically, exogenous factors happening around the clustered event day can lead the cross-correlation among firms upwards. If the effect is presented in the estimation window, the normal return calculation would be more biased. Due to this event-date clustering phenomenon, the independence assumption of abnormal returns is violated, causing the Type I error to reject a true hypothesis. Secondly, the variance of stock returns may increase around the event window, causing the event-induced variance problem. The increase occurs when an event has differing effects on firms, and it is especially applicable when using daily returns (Brown & Warner, 1985). Boehmer et al. (1991) argue that a minor increase in variance in the event period can cause the Type I error. Lastly, a departure from the normal distribution of daily excess returns could make the test result biased and inaccurate (Brown & Warner, 1985). Consequently, the violation of the statistical assumptions requires more sufficient testing models.

The assumptions of independence, equal variance, and normality are likely to be violated in our sample data. The cross-sectional correlation problem may be due to the event-date clustering when sustainable loan issuance announcements happen over the same short period.

Country-clustering is another source of cross-correlation. As shown in Section 4.3, our data covers announcements from 22 markets globally, which is argued to influence other country markets mutually (Campbell et al., 2010). In addition, the event-induced variance changing problem also shows in our data set, as the terms of issued sustainable loans may differ substantially across the sample firms. Even for loans with identical terms, variance changing may still exist if the effects of loans on firms are different. Finally, using daily returns, combined with the different market characteristics, leads to the return distribution of the sample being non-normal.

To address the potential problems in our data, we first apply the Standardized Cross-sectional Test (also known as the BMP test) developed by Boehmer et al. (1991). The BMP test works well in the presence of event-induced variance and event-date clustering by utilizing the standardized residual approach. This approach is also proved to perform well in the multi-country sample by Campbell et al. (2010). In addition to parametric test, it is the norm to report the nonparametric test since parametric tests are not well specified when the normality assumption is violated. The nonparametric test eliminates the need for parametric structure when considering the asymmetric return distribution. We perform Kolari and Pynnönen (2011)'s Generalized Rank Test (the GRANK test), which is considered one of the most powerful nonparametric tests. It overcomes the shortcomings of other rank tests (e.g., Corrado, 1989; Cowan, 1992) that cannot observe the magnitude of multi-day abnormal returns. In addition, the GRANK test is also robust to event-induced volatility, and serial correlation as well as against a certain degree of cross-correlation caused by event-day clustering.

In conclusion, we examine the statistical significance of CAAR obtained for the sustainable loan issuance using two alternative tests, including the

parametric test introduced by Boehmer et al. (1991) and one nonparametric test introduced by Kolari and Pynnönen (2011). With the combination of parametric and nonparametric tests, the potential problems in our data could be considerably reduced (Details of test statistics calculations can be found in Appendix A.1).

5.1.3 Event Study Results

Table 6: Stock Market Reaction to the Announcement of Sustainable Loan Issuance

The table reports the CAAR (%) for five different event windows around the sustainable loan issuance announcement date. The sample consists of N = 124 sustainable loan issuance events. Column (2) reports the test-statistics of the Standardized Cross-sectional Test (also known as the BMP Test) developed by Boehmer et al. (1991), and Column (3) reports the test-statistics of the Generalized Rank Test (also known as the GRANK Test) developed by Kolari and Pynnönen (2011). *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively.

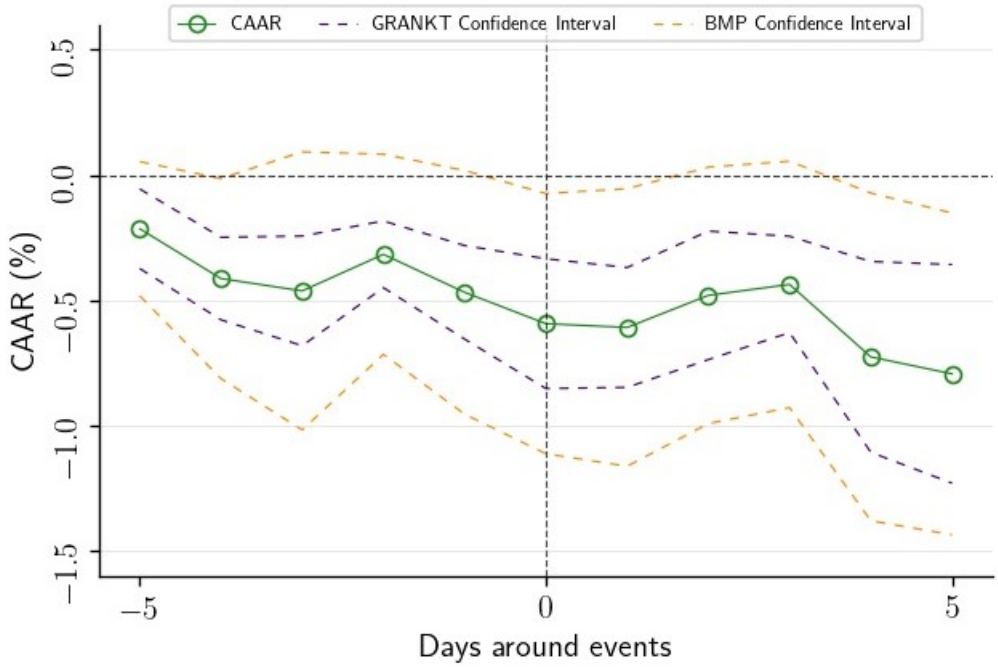
	(1)	**(2)**	**(3)**
Event time	CAAR (%)	BMP Test	GRANK Test
[-20,-11]	0.004	-0.593	1.288
[-10,-6]	-0.103	-0.444	-1.422
[-5,5]	-0.793	-2.039**	-3.000***
[6,10]	-0.012	0.566	0.760
[11,20]	0.500	0.341	0.223

Table 6 reports the results of the full sample CAARs for five event windows. As can be seen, only the CAAR of −0.793% in the [-5, 5] event window is significantly different from 0 at the 5% level of significance using the BMP test and 1% level of significance using the GRANK test. The stock market reaction during this time interval is plotted in Figure 1. Other time intervals before and after this event window yield insignificant CAARs, which indicates that other unrelated trends do not impact our result. The negative CAAR suggests that the stock market responds significantly negatively to the issuance of sustainable loans on average, supporting hypothesis H1b.

Compared to normal loan issuance, sustainable loan issuance contains two pieces of information for shareholders, which are a bank lending relationship and a commitment to sustainability improvements. As mentioned in Section 2, the stock market has been unresponsive to the bank loan issues recently; the negative stock market reactions tend to reflect shareholder valuation of the latter information. Our result is in line with prior studies that document negative CAARs in response to good ESG news (e.g., Fisher-Vanden & Thorburn, 2011; Krüger, 2015).

Figure 1: Cumulative Average Abnormal Returns around Sustainable Loan Issuance

The figure plots the CAAR (%)) around the announcement of sustainable loan issuance. The sample consists of N=124 events. The dotted lines represent the 90% confidence intervals of the GRANK and BMP Tests.



In addition, Table 7 presents the subsample results related to the factors that could impact the announcement returns. More specifically, it explores the loan characteristics: 1) whether the issuance is located in an EU country[3], 2) whether it is renewed from existing loans with a non-sustainability purpose,

[3]Although Norway and Switzerland are not member countries of EU, we include them as EU countries because of the same accounting standards and regulations.

3) whether it is certified by a third-party agency, and 4) whether the loan is issued after the market crash caused by the COVID-19 pandemic.

Table 7: Stock Market Reaction to the Announcement of Sustainable Loan Issuance, Subsamples

The table reports the CAAR (%) using the market model in event window [-5,5] around the announcement date of sustainable loan issuance for four subsamples. The subsamples include 1) whether its borrower locates in the EU countries, 2) whether it is renewed from existing loans with a non-sustainability purpose, 3) whether it is certified by a third-party agency, and 4) whether it is issued after the COVID-19 market crash. Panels A to D report the results of the four subsamples, respectively. Column (2) reports the test-statistics of the Standardized Cross-sectional Test (also known as the BMP Test) developed by Boehmer et al. (1991), and Column (3) reports the test-statistics of the Generalized Rank Test (also known as the GRANK Test) developed by Kolari and Pynnönen (2011). *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively.

		(1)	**(2)**	**(3)**
	N	CAAR (%)	BMP Test	GRANK Test
Panel A. EU Countries vs. non-EU countries				
EU countries	79	-1.133	-2.272**	-3.633***
Non-EU countries	45	-0.196	-0.230	0.683
Panel B. Renewed vs. new loan				
Renewed loan	61	-0.689	-0.668	-0.586
New loan	63	-0.893	-2.036**	-3.300***
Panel C. Certified vs. non-certified loan				
Certified loan	29	-0.624	-0.360	-0.521
Non-certified loan	95	-0.844	-2.064**	-3.169***
Panel D. Before COVID-19 vs. After COVID-19				
Before COVID-19	82	-0.347	-1.300	-1.849*
After COVID-19	42	-1.664	-1.572	-2.119***

In Panel A, loan issuance in EU countries presents a significantly negative CAAR of -1.133%, while CAAR is smaller and insignificant for a loan issued outside the EU. As discussed in Section 4.1, the EU provides a more standardized environment for investors to access sustainable finance than the rest of the world. However, according to Mark Carney, the former Bank of England governor and UK climate advisor, the regulations in the EU, including the sustainability regulation obligations and classification system defined in the EU Taxonomy, are so purist and rigid that too many profitable investments are excluded (Financial Times, 2021). In line with this argument, our negative result documents that the foregone investment

opportunities are not in line with the best interests of shareholders. Therefore, shareholders in the EU may think of sustainable loan issuance as a costly activity.

Panel B presents a significantly negative CAAR of −0.893% for the newly issued sustainable loans, but CAAR is higher and indistinguishable from zero for renewal issues from normal loan. Since bank loans convey the signal to the capital market regarding the creditworthiness of borrowers, a repeated issuance may reduce information asymmetry and make investors less concerned about renewal loans by strengthening the lending relationship. Our result is in line with Lummer and McConnell (1989) who report a positive market reaction to loan renewals while there is no significant response to new loan announcements.

In Panel C, the market response is only significant for non-certified issuances with a negative CAAR of −0.844%. As discussed in Section 4.1, borrowers are encouraged to undergo third-party verification for their ESG performance. The third-party certification for sustainability level, therefore, is viewed as more reliable, which reduces the information asymmetries and helps shareholders to better understand the firm's ESG strengths or weaknesses (Fatemi et al., 2018). In other words, certification plays a moderate role in reducing the negative magnitude of the market response.

In panel D, the stronger negative reaction happens to the loan granted after the market crash caused by the COVID-19 pandemic at −1.664%, which is almost double the negative effects of the full sample. COVID-19, an unexpected and exogenous factor that has caused a serious financial market crash worldwide, provides an inimitable opportunity to question whether shareholders value the signal of ESG investment from the debt issuance during the macro crisis (Broadstock et al., 2021). In our thesis, we define the start of the market crash due to the COVID-19 crisis as February 24^{th}, 2020, which was the first trading day after the first lockdown in Italy (Ramelli &

Wagner, 2020). The stock indices in most markets all over the world in countries such as Italy, France, and Germany, plunged on this day (Papadamou et al., 2020). Our result shows that the cost to shareholders when issuing sustainable loans after the COVID-19 market crash is higher than in normal times, suggesting that issuing sustainable loans is even harmful to shareholders when exogenous macro shocks come. Our negative result is the opposite from that of the previous research conducted by Albuquerque et al. (2020) and Bae et al. (2021) that test solely the ESG characteristics' impact on the stock market. To capture the full influence of COVID-19 on market reaction, we conduct a more consolidated analysis later on in Section 5.2.

5.1.4 Robustness Tests

To address some potential concerns, we present two robustness checks regarding the estimation approach. The results are provided in Appendix A.2 and are briefly described as following.

Global market model based on MSCI world index. We re-run the event study using a uniform world market index from Morgan Stanley Capital International (MSCI) instead of the country-specific market indices. This robust check still gives negative CAARs for the full sample and subsamples.

Global three-factor model from Fama and French. We also try to use the three-factor model of Fama and French (1993) to address the concern that comes with the inadequacy of other non-event characteristics.[4] In addition to the market return factor, this model includes two other factors SMB and HML, which represent the firm size and value, respectively (see Appendix A.2 for details). As is shown in the table, the result is consistent with the outcome of the main model.

[4]The global Fama-French three factors daily data is acquired from the Kenneth R. French database.

Compared to the result of our main model, the CAARs for the full sample and subsamples in the robust models are lower, especially using the Fama-French three-factor model. When considering size and value risk factors of firms instead of just the market risk factor, the estimated coefficients exclude the outperforming tendency for those small-cap and value borrowers, strengthening our results.

5.2 Cross-Sectional Determinants of the Cumulative Abnormal Returns

The result from the event study analysis in Section 5.1.3 above suggests that investors penalize companies for loans issued in the EU region, loans without third-party certification, new loans, and loans announced after the COVID-19 market crash. However, stock price reaction to the sustainable loan issuance is different between firms. To identify the major determinants for explaining variation in CARs across our sample firms, we further apply the cross-sectional analysis with CAR as our dependent variable. One of our concerns is that choosing to borrow sustainable loans instead of normal loans means that sample firms self-select the event, leading to biased coefficient estimates (Heckman, 1979). From Section 4.4, the univariate analyses of the sustainable loan borrowers and normal loan borrowers show several differences in their financial and ESG characteristics. Thus, we use Heckman two-stage model to control the endogeneity of borrowing sustainable loans.

5.2.1 The Voluntary Decision to Borrow Sustainable Loans

In the first stage, we estimate the following probit regression of choice to borrow a sustainable loan instead of a normal loan. We restrict the control firms as normal loan borrowers in the same two-digit NAICS code, country, and year as sample firms, so the self-select decision is linked with the firm's

willingness and the ability for a sustainability-related adoption. Specifically, we estimate the following regression:

$$\begin{aligned} Prob(ESGLOAN = 1|X) = \phi(&\alpha_0 + \alpha_1 E\_SCORE + \alpha_2 S\_SCORE \\ &+ \alpha_3 G\_SCORE + \alpha_4 GSV + \alpha_5 FEMALE \\ &+ \alpha_6 SIZE + \alpha_7 MBRatio + \alpha_8 ROA \\ &+ \alpha_9 BOARDSIZE + \alpha_{10} GHG\_SECTOR), \end{aligned} \tag{5}$$

where $ESGLOAN$ is an indicator variable that is equal to one if the firm borrows a sustainable loan in year t, and zero otherwise. The additional variables are used to control factors that influenced a firm's decision to borrow a sustainable loan instead of a normal loan; we discuss these explanatory variables below. All data are in the fiscal year before the loan issuance.

First, firms with profound environmental strengths are more likely to participate in voluntary environmental programs, as the management may have incentives to improve firms' environmental performance (Fisher-Vanden & Thorburn, 2011). The paper also reports that weak corporate governance firms where managers face lower shareholder oversight tend to make voluntary environmentally responsible investment decisions. Thus, we include three ESG pillar scores from Refinitiv, including Environmental Score (E_SCORE), Social Score (S_SCORE), and Governance Score (G_SCORE) as the proxies for firms' ESG performance.[5]

Second, the public attention towards climate change has changed over time, putting firms under increasing pressure and scrutiny to take ESG initiatives seriously (Fisher-Vanden & Thorburn, 2011; Flammer, 2012). To obtain a quantitative proxy for investors' attention, we apply the Google Search Volume (GSV) provided by Google Trends, which is the relative

[5]We divide three variables by 100 for coefficients not showing 0.000 in our model results.

search volume of any query submitted to Google (Da et al., 2011). Google Trends normalizes search data over time and location instead of providing absolute frequencies of searched queries. Each data point is defined on a range of 0 to 100 based on a topic's proportion to all searches on all topics, where 100 represents the time where the search term had the largest share of the total queries in the chosen region[6]. This method allows for the comparison between different regions and time periods. We extract the monthly index of the "climate change" topic from 2017 to 2020 for each country.[7] Then, we include the median monthly *GSV* data over the 12 months ending in the month before the announcement to capture the change in public interest in sustainability.

Third, recent studies suggest that gender diversity on the board of directors could enhance the firm's ESG outcome, as the female presentation would impact the firm's adoption of proactive ESG strategies (Zhang et al., 2013; Ben-Amar et al., 2017). In other words, firms with more female directors would behave in more socially responsible ways. We use the variable *FEMALE* as the percentage of female directors, calculated as the number of female directors divided by the total number of directors.

Furthermore, previous research confirms that larger firms are more likely to participate in voluntary environmental programs and voluntary disclosure of ESG information (Brammer & Pavelin, 2006; Hsueh, 2019). This is because big firms have a greater capacity to cover the higher cost for sustainability investment (Khanna et al., 2007). Pressure from external groups, including regulators, competitors, institutional investors, and the public, may also be

[6]The information is from FAQ about Google Trends data, retrieved from https://support.google.com/trends/answer/4365533?hl=en&ref_topic=6248052.

[7]The topic search options in Google Trends allow the capture of similar keywords within the topic, regardless of the difference in language in each location (for example, "global warming" and "climate change" are under the "climate change" topic. Also, since our sample does not have Chinese firms, it is feasible to use the Google Search Volume to capture public attention.

greater; consequently, the management from larger firms has a strong incentive for ESG improvement (Guenther et al., 2016; Luo et al., 2012). Therefore, we implement *SIZE* as one of the determinants for choosing a sustainable loan.

Following previous literature (i.e., Fisher-Vanden & Thorburn, 2011; Zhang et al., 2013), we also incorporated several variables into our model that might affect the decision for sustainable loan issuance, including *BOARDSIZE, ROA,* and *MBRatio*. Moreover, we include a dummy variable, *GHG_SECTOR*, that takes the value of 1 if a corporation operates in a GHG-intensive sector. As firms from carbon-intensive industries are subject to higher climate change risks, they are more likely to engage in voluntary climate change activities such as public carbon disclosure (Brammer & Pavelin, 2006; Reid & Toffel, 2009). We follow Hsueh (2019) in identifying energy, materials, and utilities as GHG-intensive sectors.

Table 8: Cross-Sectional Analysis of Cumulative Abnormal Return

The table reports coefficients that are estimated from Heckman two-stage model. The dependent variable *(CAR)* is cumulative abnormal returns over the 11-day event window from the market model in Section 5.1. COVID *(COVID)* is a dummy variable set equal to 1 if the announcement is made after the global market crash on 24^{th} February 2020. Google Search Volume *(GSV)* is the median monthly search index downloaded from Google Trends over the 12 months ending in the month before the announcement. Firm size *(SIZE)* is the variable indicating the size of the firm and is measured by the natural logarithm of the firm's total assets. Market-to-book ratio *(MBratio)* is the market value of equity plus book value of total debt divided by total assets. Return on assets *(ROA)* is the ratio of net income after tax to the book value of total assets. *E_SCORE, S_SCORE*, and *G_SCORE* are the three ESG pillar scores from Refinitiv. Board size *(BOARDSIZE)* is the total number of directors serving on the board. Gender diversity *(FEMALE)* is the percentages of female directors presented on the board of directors. *GHG_SECTOR* is a dummy variable that takes a value of 1 if a corporation operates in a GHG-intensive sector. Inverse Mills ratio (*IMR*) is estimated from the first stage probit model. Standard errors clustered at the two-digit NAICS industry are reported in parenthesis. *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively.

	First stage	Second stage	OLS Model	
	Prob(ESGLOAN=1)	CAR (%)	CAR (%)	CAR (%)
	(1)	**(2)**	**(3)**	**(4)**
COVID		-2.112***	-2.133***	-1.777**
		(0.677)	(0.690)	(0.643)
GSV	0.010**	0.049***	0.061**	0.051**
	(0.005)	(0.016)	(0.023)	(0.022)
SIZE	-0.001	-0.416	-0.415	
	(0.054)	(0.517)	(0.457)	
MBratio	-0.001	-0.138	-0.157	
	(0.001)	(0.186)	(0.207)	
ROA	-0.015**	0.230*	0.206*	
	(0.006)	(0.122)	(0.109)	
E_SCORE	1.657***	-4.465	-1.487	
	(0.386)	(5.153)	(3.761)	
S_SCORE	1.227**	-0.105	1.667	
	(0.502)	(4.029)	(2.586)	
G_SCORE	-0.809**	2.334	1.160	
	(0.336)	(2.493)	(3.385)	
BOARDSIZE	-0.067***	-0.237	-0.351	
	(0.026)	(0.148)	(0.224)	
FEMALE	0.019***	-0.093**	-0.051	
	(0.006)	(0.042)	(0.034)	
IMR		-2.315		
		(2.437)		
GHG_SECTOR	0.538***			
	(0.153)			
Constant	-2.743***	17.060**	10.697	-2.455*
	(1.022)	(7.712)	(6.418)	(1.198)
Observations	1,051	103	103	124
Peusdo-R^2	0.2224			
R^2		0.203	0.195	0.050

Column (1) in Table 8 reports the findings of the probit analysis of the firm decision to borrow a sustainable loan instead of a normal loan. The control firms are normal loan borrowers in the same two-digit NAICS code, country, and year as sample firms. The regression is statistically significant with a pseudo R^2 of 22%. The coefficient of *E_SCORE* is significantly positively related to the probability of issuing sustainable loans relative to normal loans at the significant level of 1%. The *S_SCORE* estimated coefficient is also positive and significantly related to the probability of selecting sustainable loans instead of normal loans. These findings are consistent with the literature that public firms with strong environmental and social performance tend to engage in ESG activities. The coefficient for *G_SCORE*, in contrast, is significantly negative at the 5% level of significance, which indicates that firms with weak corporate governance tend to choose sustainable loans over normal loans. In addition, we also find that the public awareness about climate change and female directors' presence are both positive and significantly influence firms to borrow a sustainable loan.

5.2.2 Cross-Sectional Analysis of Cumulative Abnormal Return

In the second stage, to identify the firm-specific characteristics that influence the magnitude and direction of the CARs across sample firms, we perform the cross-sectional analysis with CARs over the 11-day event window as the dependent variable. This analysis assumes that shareholders assess the expected costs and benefits of sustainable loan issuances, including those related to accounting information quality and ESG indicators. We use the estimated results from the first-stage probit model to create a bias correction parameter for each observation, the Inverse Mills ratio *(IMR)*[8], to include in

[8]The Inverse Mills ratio *(IMR)* is defined as the ratio of the standard normal density (ϕ), divided by the standard normal cumulative distribution function (Φ) from first probit model: IMR(x) $=\phi(x)/\Phi(x)$ (Heckman, 1979).

second stage regression. The *IMR* variable accounts for potential sample selection bias/ unobservable factors that affect a manager's decision to borrow sustainable loans. Additionally, to test Hypothesis 3 on changes in abnormal returns to announcements after the crisis, we follow previous Section 5.1.3 and add *COVID* as a dummy variable set equal to 1 if the announcement is made after the global market crash on 24^{th} February 2020.

Furthermore, it is crucial to follow the exclusion restrictions in the Heckman selection model, deciding which of one or several independent variables in the first stage regression should be removed in the second stage model (Lennox et al., 2012; Wooldridge, 2015). Without exclusion restriction, the second regression might suffer from high levels of multicollinearity. While not tabulated here, we compute the variance inflation factors (VIFs) for the second regression with all independent variables from Eq. 5 and find that VIF for *IMR* is 31.56, suggesting that multicollinearity is likely a problem. As a result, we need to exclude at least one independent variable from the second stage. This independent variable needs to be significantly correlated with the dependent variable in the first-stage model but not associated with the dependent variable in the second-stage model (Lennox et al., 2012). The *GHG_SECTOR* dummy variable satisfies both conditions for an exclusion variable. Previous studies confirm that firms that emit substantial amounts of GHG emissions are more likely to engage in voluntary climate change mitigation and related activities. In addition, the dummy for the carbon-intensive sector shows no significant influence on a firm's announcement returns (Fisher-Vanden & Thorburn, 2011). From Panel A of Table 9, the coefficient on *GHG_SECTOR* is positive and significantly different from zero at a level of 1%, suggesting that this is a reasonable choice.

Our second regression is specified as follows:

$$CAR_{it} = \alpha_0 + \alpha_1\, COVID_t + \alpha_2\, GSV_{t-1} + \alpha_3\, IMR_i + \beta\, X_{it-1} + \epsilon_{it}, \qquad (6)$$

where X_{it-1} is a vector of control variables, IMR is the Inverse Mills ratio calculated based on the estimated results from the first-stage probit model, and ϵ_{it} is the error term. Standard errors are clustered at the two-digit NAICS industry code to account for dependence across firms within the same industry.[9]

Column (2) in Table 8 shows the result of the second-stage model regressing CAR over an 11-day event window. Our first result is that the COVID coefficients are negative and significant at a 1% level, which indicates that the stock prices of borrowing firms respond more negatively after the pandemic. All else being equal, the difference in shareholder loss between firms announcing their commitment to sustainable loans before and after the recent global pandemic is about 2.112% in CAR over 11 days. The COVID-19 pandemic has impacted the debt market severely, and the need for short-term liquidity in light of market volatility and macroeconomics uncertainty has increased. Thus, this negative reaction could be explained as it is more difficult to get external funding after the pandemic, and investors could observe this action as being more costly for the firm. This finding supports Hypothesis 3's prediction that the investors react to sustainable loan issuances more negatively after the COVID-19 market crash in February 2020.

[9]Regarding the correlation matrix, Table 14 in Appendix A.4.1 presents the Pearson correlation between the variables included in the regression models. Consistent with our expectations, CAR is significantly negatively correlated with *COVID* but positively correlated with GSV. The correlation coefficients are lower than the threshold of 0.8, indicating the absence of multicollinearity problems in our models. To further test for the possibility of multicollinearity, we compute the variance inflation factor (VIF) (details in Appendix A.4.2), and the highest VIF score (for the Inverse Mills ratio) is 5.44, which is below the conventional benchmark of 10. The results confirm that the multicollinearity problem does not exist in the regressions.

The variable for public interest in climate change produces a significantly positive coefficient at a 1% significance level. This shows evidence consistent with our Hypothesis 4 that the announcement returns are higher in periods of close attention from the general public to climate change, all else equal. The result is also consistent with Fisher-Vanden and Thorburn (2011)'s finding. Using a sample of US public firms announcing their participation in voluntary environmental programs from 1993 to 2008, they find that stock price decrease is higher when there are few concerns about climate change from the general public.

Finally, the Inverse Mills ratio is insignificant, indicating that self-selection does not significantly affect CARs after controlling for determinants of sustainable loan issuance decision. To examine the robustness of our Heckman two-stage results (Column (3) and (4) in Table 8), we regress the second-stage model without the Inverse Mills ratio and without control variables, respectively, and the main inference remains the same.

6 Long-Term Impact on Shareholder Wealth

6.1 Measuring Long-Run Equity Returns

In this section, we measure the long-run common stock performance of sustainable loan borrowers. For investigating the long-run post-performance, several models can be applied to measure accurate abnormal returns in event time. The approaches commonly used in previous research are cumulative abnormal returns (CARs) and buy-and-hold abnormal returns (BHARs). Unlike testing short-term abnormal returns, the long-term abnormal price performance is susceptible to the use of benchmark return and the procedure (i.e., Canina et al., 1998; Lyon et al., 1999; Kothari & Warner, 2007). Ritter (1991) states that CARs and BHARs could give different results, and the

long-run CARs could create upward bias, rebalancing bias, and new listing bias problems. Barber and Lyon (1997) argue that the long-run abnormal returns should be calculated as the simple buy-and-hold return difference between a sample firm and its control firm. This approach could reduce the misspecification bias and reflect investors' real experiences more accurately (Schöber, 2008). To measure the long-run post-performance of sustainable loan borrower stock, we compute the $BHAR$ for 1 to 6 event months with an average of 20 trading days per month from purchasing the shares of the issuing firm at the closing price on the day after the announcement. We compute ($BHAR$) for each firm, following Barber and Lyon (1997):

$$BHAR_{it} = [\prod_{t=1}^{T_i}(1 + R_{it}) - \prod_{t=1}^{T_i}(1 + R_{it}^{B})] * 100\%, \tag{7}$$

where R_{it} and R_{it}^{B} are the monthly returns on sample firms and the corresponding benchmark, respectively, in event month t following the announcement, and T_i is the number of trading months in the post-period following the loan announcement. The matched firm return is used as the benchmark for sustainable loan borrowers.

The average BHAR for all firms is then calculated as:

$$\overline{BHAR_t} = \frac{1}{N_i}\sum_{t=1}^{T_i} BHAR_{it}. \tag{8}$$

For the significance test, a Student's one-sample t-test is normally used to check if average long-run abnormal returns are statistically significantly different from zero. However, BHAR is severely positively skewed, leading to negatively biased t-statistics (Loughran & Ritter, 1995; Barber & Lyon, 1997). Therefore, we use the bootstrap procedure proposed by Lyon et al.

(1999) to compute skewness-adjusted test statistics for the null hypothesis of zero abnormal returns as follows:

$$t(\overline{BHAR_t}) = \sqrt{N_t}(S + \frac{1}{3}\hat{\gamma}S^2 + \frac{1}{6N_t}\hat{\gamma}), \tag{9}$$

where $S = \dfrac{\overline{BHAR_t}}{\sigma(BHAR)}$, and $\hat{\gamma}$ is the estimate of the coefficient of skewness: $\hat{\gamma} = \dfrac{\sum_{i=1}^{N_t}(BHAR_{it} - \overline{BHAR_t})^3}{N_t\sigma(BHAR_t)^3}$.

6.2 Matched Firm Selection

The definition of peer firms is important to control for firm characteristics that affect the decision. Previous studies commonly use size and book-to-market ratio (MBRatio) as matching characteristics in the BHAR method because of their relations to stock returns (Loughran & Ritter, 1995; Barber & Lyon, 1997). However, Bessembinder and Zhang (2013) state that selecting control firms based on additional characteristics other than size and MBRatio could reduce potential biases in assessing abnormal returns from differences in firms' idiosyncratic risks. Hence, we apply several matching covariates to select the most similar control firms. We first consider only public firms in the same two-digit NAICS industry and country as sample firms. Matching on country and industry allows the treated and control firms to operate in the same business environment (i.e., economic challenge, regulatory) and eliminates any country-specific (industry-specific) news affecting market reaction around event windows. Specifically, we match each sustainable loan issuing firm with a comparison firm that has borrowed normal loans during the four years. In addition, following the literature standard (i.e., Almeida et al., 2012; Flammer, 2021), we matched firms based on size, capital structure, ROA ratio, MBRatio, liquidity ratio, and three ESG pillar scores in the year preceding the sustainable loan issuance. This

procedure is designed to select a comparison firm based on similar ESG performance, profitability and investment opportunities, and the same available liquidity and access to the capital market. Since the data for ESG score is not available for all firms, we use the remaining variables to find matches for firms with insufficient ESG data. Furthermore, the matched firm is required to have frequent trading and stock price data to avoid the thin trading problem. Then, we apply the nearest neighbor Mahalanobis distance metric based on defined mentioned covariates to pick from the control group, with replacement, the firm with the lowest distance.[10] We discard any firm-year observations that are unable to satisfy the above matching criteria, resulting in the final matched peers containing 110 firm-year observations or 115 loan announcement events.[11]

Table 9 reports summary statistics illustrating the similarity of the sample firms and matched firms with respect to several characteristics in the fiscal year preceding sustainable loan issuance. We use two-sample t-test and Wilcoxon signed-rank test to check for any significant differences in covariate means and medians for both groups. As we can see, there are no statistically significant differences in the distributions of the matching variables between treated and matched firms. The p-values range between 0.131 for *LIQUIDITY* to 0.814 for *LEVERAGE* for the t-test (p-values from 0.269 to 0.801 for the Wilcoxon signed-rank test). Hence, we appear to have achieved fairly precise matches for sustainable loan borrowers.

[10]The Mahalanobis distance is to scale the contribution of individual variables to the distance value according to the variability of each variable: $||X_i\text{-}X_j|| = \sqrt{(X_i - X_j)' \sum_X^{-1} (X_i - X_j)}$. For each sample firm i, we select the matched firm j such that the Mahalanobis distance between the i's and j's matching variables is the smallest, where X is a k-dimensional vector of covariates and $\sum_X^{-1}$ is the inverse of the covariance matrix of the covariates (Almeida et al., 2012).

[11]We rerun the event study with 115 loan announcements, and the main inference remains. The results are in Appendix A.3

Table 9: Matching

This table reports the statistics of the characteristics used for matching for both sustainable loan borrowers and their matched peers. Firm size *(SIZE)* is the variable indicating the size of the firm and is measured by the natural logarithm of the firm's total assets. Leverage *(LEVERAGE)* is measured by dividing a firm's total debt by its total assets. Return on assets *(ROA)* is the ratio of net income after tax to the book value of total assets. Liquidity *(LIQUIDITY)* is total cash and short-term investment scaled by total assets. Market-to-book ratio *(MBratio)* is the market value of equity plus book value of total debt divided by total assets. *E_SCORE, S_SCORE*, and *G_SCORE* are three ESG pillar scores from Refinitiv. Column (1) and Column (3) provides the mean and median statistics of each variable for the matched pairs respectively. Column (2) represents the p-value of the t-test for difference in means. Column (4) represents the p-value of the Wilcoxon signed-rank test for medians. *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively.

			(1)	**(2)**	**(3)**	**(4)**
		N	Mean	P-value (Diff. in Mean)	Median	P-value (Diff. in Median)
SIZE	Sustainable Loan Borrowers	110	22.933	0.324	23.140	0.282
	Matched Borrowers	110	22.745		22.615	
LEVERAGE	Sustainable Loan Borrowers	110	0.312	0.814	0.307	0.801
	Matched Borrowers	110	0.308		0.286	
ROA	Sustainable Loan Borrowers	110	0.036	0.513	0.033	0.613
	Matched Borrowers	110	0.034		0.032	
LIQUIDITY	Sustainable Loan Borrowers	109	0.081	0.131	0.075	0.269
	Matched Borrowers	109	0.095		0.073	
MBRatio	Sustainable Loan Borrowers	110	1.595	0.243	1.283	0.576
	Matched Borrowers	110	1.818		1.343	
E_SCORE	Sustainable Loan Borrowers	89	71.15	0.408	74.881	0.577
	Matched Borrowers	89	68.676		74.390	
S_SCORE	Sustainable Loan Borrowers	89	71.625	0.684	78.205	0.511
	Matched Borrowers	89	70.474		73.216	
G_SCORE	Sustainable Loan Borrowers	89	59.968	0.530	63.627	0.727
	Matched Borrowers	89	61.768		61.886	

6.3 Result

Table 10 shows the BHARs for up to six months after the announcements. Compared to the matched firms' returns, our sample firms show almost the same post-announcement performance on average. After six months, the average BHAR is 0.713%, insignificantly different from 0 from the bootstrapped skewness-adjusted t-statistic by Lyon et al. (1999). Despite the significant negative short-term market reaction to the sustainable loan issuance news, we cannot find any pattern of the BHARs during six months. The comparison with matched peers that have the same financial status and ESG profile reveals the pure effect of sustainable loan issuance, regardless of other ESG considerations. This insignificance leads to the conclusion that sustainable debt issues have no impact on shareholder wealth in a six-month period. As a result, we are unable to accept our hypothesis for long-term abnormal returns for investors of sustainable loan borrowers.

Table 10: Long-Term Buy-and-Hold Abnormal Return

This table reports the average BHAR (%) after the announcements of 115 sustainable loan issuances with the bootstrapped skewness-adjusted t-statistic by Lyon et al. (1999) for each BHAR in the observed months. *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively.

Month	N	BHAR (%)	t-stat
1	115	-0.032	-0.037
2	115	0.164	0.111
3	115	0.112	0.072
4	115	-2.169	-1.114
5	115	-0.643	-0.320
6	115	0.713	0.251

The results of long-term abnormal returns can be interpreted as the institutionalization of the ESG concept. Flammer (2012) explains that shareholders are less reactive to the announcement of ESG-friendly activities when sustainability becomes an external norm for the whole of society. For example, the Aegon poll in 2021 shows that 77% of those surveyed consider ESG-related risks when investing (Webb, 2021). In this case, firms will need

to commit to sustainability to satisfy the needs of investors, which reduces the significance of ESG. Furthermore, the institutionalization can also be stricter external scrutiny of corporates regarding ESG activities. Reducing the information asymmetry between shareholders and managers, the scrutiny prevents corporate decisions that earn a reputation for managers at the shareholders' cost, which further prevents potential sustainability-washing. Therefore, the negative shareholder perception of sustainable loan issuance can be offset by the stricter scrutiny. Another possible explanation for this comes from a flaw of our data set for long-term research in that the investigation period is relatively short, only lasting for up to six months after the announcement. Since most of the sustainable loans are long-term debt, of which the funds would not be invested in at once, the six-month observation period may not be able to reflect the long-term effects on shareholders. Our result, in this situation, can only provide a certain reference for future research.

7 Conclusion

Our thesis answers the research question of whether sustainable lending affects shareholder wealth in the short and long run. Sustainable loan, a new bank instrument in sustainable finance, is under-researched in literature due to its short origins and relative opaqueness. Since ESG engagement could influence firm value and eventually shareholder wealth, it is crucial to examine the stock market reaction to sustainable loan issuance, conveying whether shareholders value the commitment towards sustainability through the financial market.

Contrary to the earlier research targeting green bond issuance (see, e.g., Tang & Zhang, 2020; Flammer, 2021), we observe a significantly negative CAAR of -0.793% for a sample of 124 sustainable loan issuance announcements. We further find that the average loss is amplified for loans

issued in the EU region, non-certified loans, and new loans. Our short-term event study results show that shareholders respond significantly negatively to the sustainable loan issuance, supporting hypothesis H1b. This negative reaction is consistent with the shareholder theory that shareholders perceive the ESG activities as a manifestation of the agency problem, which is costly for shareholders as it earns reputations for managers using shareholders' money. In addition, from a cross-sectional analysis with CARs as the dependent variable, the negative returns are proved to be particularly pronounced for companies issuing sustainable loans after the COVID-19 market crash in February 2020, suggesting that sustainability does not eliminate the damage caused by the exogenous shock to shareholder value but even leads to a more negative reaction (supporting hypothesis H3). However, with the rising public attention towards sustainability, the increasing external scrutiny reduces the opaqueness and agency costs so that shareholder expectation of sustainable loan issuance improves (supporting hypothesis H4).

Nonetheless, the long-term stock abnormal return calculated from the buy-and-hold strategy shows no significant evidence of underperformance. We find that buy-and-hold abnormal returns ranging up to six months are not significantly different from zero, implying that shareholder wealth does not increase in the post-issuance period. We argue that the long-term effect on shareholders may be insignificant due to the following reasons. First, as sustainability is becoming a more widely accepted norm in recent years, firms may face more severe punishments for not following the norm while the rewards to firms following the norm are gradually reduced (Flammer, 2012). As a result, committing to sustainability is no longer unique to the stock market, resulting in no effects on shareholder wealth. Second, the external norm exerts more scrutiny pressure on firms' ESG activities, which to some extent prevents the sustainability-washing concerns. Therefore, shareholders

are more likely to align their interests with other stakeholders to improve ESG performance, reducing the potential costs to shareholders. Lastly, the six-month period following the issuance may be too short to observe the actual impact of sustainable loans on shareholder return since the loan issuances are primarily long-term with an average tenor of about several years. Our long-term research result may thus not fully reflect the effects on shareholder wealth.

We are aware that our thesis may have several limitations. First, since sustainable loans are new financial instruments, our research sample size is relatively small in a short period from 2017 to 2020, especially for the long-term research that only covers the post-announcement period of six months. As most sustainable loans are long-term debt, only a six-month investigation period may be relatively short to observe the value change brought to shareholders. Therefore, this leaves the question of whether there might be an impact on a firm's sustainability performance, climate change risk, and shareholder value in the long run. As more data becomes available, future research could provide more complete results and sophisticated analyses of the long-term implications of sustainable loans. In addition, the primary reasons why firms' managers choose to borrow sustainable loans instead of normal loans are still ambiguous in our thesis. We call for the use of qualitative data, for example, by conducting interviews and/or surveys with managers to understand the motivation for issuing sustainable loans and how firms view the conflict between sustainable loan issuance and shareholder perceptions. Finally, with the rapid growth of sustainable and responsible investing (SRI), the new regulation on ESG reporting is not integrated into our thesis. The recently launched Corporate Sustainability Reporting Directive (CSRD) and Climate Law could affect the sustainable loan framework as non-financial disclosure mandates. Integrating with the standardized regulations, the role of sustainable loans in supporting ESG

targets will need further research and analysis. An exploration of these issues will be the subject of future research.

References

Albuquerque, R., Koskinen, Y., Yang, S., & Zhang, C. (2020). Resiliency of environmental and social stocks: An analysis of the exogenous COVID-19 market crash. *The Review of Corporate Finance Studies*, *9*(3), 593–621.

Almeida, H., Campello, M., Laranjeira, B., & Weisbenner, S. (2012). Corporate debt maturity and the real effects of the 2007 credit crisis. *Critical Finance Review*, *1*(1), 3–58.

Al-Tuwaijri, S. A., Christensen, T. E., & Hughes, K. E. (2004). The relations among environmental disclosure, environmental performance, and economic performance: A simultaneous equations approach. *Accounting, Organizations and Society*, *29*(5), 447–471.

Asgari, N. (2019). *Europe's first sustainable junk bond draws scrutiny over green impact. Financial Times*. https://www.ft.com/content/d7fa935a-a2d5-4d8d-bee5-77a92bce5e2c

Bae, K. H., El Ghoul, S., Gong, Z., & Guedhami, O. (2021). Does CSR matter in times of crisis? evidence from the COVID-19 pandemic. *Journal of Corporate Finance*, *67*, 101876.

Barber, B. M., & Lyon, J. D. (1997). Detecting long-run abnormal stock returns: The empirical power and specification of test statistics. *Journal of Financial Economics*, *43*(3), 341–372.

Becchetti, L., Ciciretti, R., Hasan, I., & Kobeissi, N. (2012). Corporate social responsibility and shareholder's value. *Journal of Business Research*, *65*(11), 1628–1635.

Ben-Amar, W., Chang, M., & McIlkenny, P. (2017). Board gender diversity and corporate response to sustainability initiatives: Evidence from the carbon disclosure project. *Journal of Business Ethics*, *142*(2), 369–383.

Berg, F., Koelbel, J., & Rigobon, R. (2019). Aggregate confusion: The divergence of ESG ratings. *MIT Sloan School of Management*.

Bessembinder, H., & Zhang, F. (2013). Firm characteristics and long-run stock returns after corporate events. *Journal of Financial Economics*, *109*(1), 83–102.

Billett, M. T., Flannery, M. J., & Garfinkel, J. A. (1995). The effect of lender identity on a borrowing firm's equity return. *The Journal of Finance*, *50*(2), 699–718.

Billett, M. T., Flannery, M. J., & Garfinkel, J. A. (2006). Are bank loans special? Evidence on the post-announcement performance of bank borrowers. *The Journal of Financial and Quantitative Analysis*, *41*(4), 733–751.

Boehmer, E., Masumeci, J., & Poulsen, A. B. (1991). Event-study methodology under conditions of event-induced variance. *Journal of Financial Economics*, *30*(2), 253–272.

Boot, A. W. A., & Thakor, A. V. (2000). Can relationship banking survive competition? *The Journal of Finance*, *55*(2), 679–713.

Brammer, S., & Pavelin, S. (2006). Voluntary environmental disclosures by large UK companies. *Journal of Business Finance and Accounting*, *33*(7-8), 1168–1188.

Broadstock, D. C., Chan, K., Cheng, L. T. W., & Wang, X. (2021). The role of ESG performance during times of financial crisis: Evidence from COVID-19 in China. *Finance Research Letters*, *38*, 101716.

Brown, S. J., & Warner, J. B. (1985). Using daily stock returns: The case of event studies. *Journal of Financial Economics*, *14*(1), 3–31.

Campbell, C. J., Cowan, A. R., & Salotti, V. (2010). Multi-country event-study methods. *Journal of Banking and Finance*, *34*(12), 3078–3090.

Canina, L., Michaely, R., Thaler, R., & Womack, K. (1998). Caveat compounder: A warning about using the daily crsp equal-weighted

index to compute long-run excess returns. *The Journal of Finance*, *53*(1), 403–416.

Capelle-Blancard, G., & Petit, A. (2019). Every little helps? ESG news and stock market reaction. *Journal of Business Ethics*, *157*, 543–565.

Carbon Disclosure Project. (2019). *Global Supply Chain Report 2019*. https://www.cdp.net/en/research/global-reports/global-supply-chain-report-2019

Chollet, P., & Cellier, A. (2011). The impact of corporate social responsibility rating announcements on european stock prices. *International Conference of the French Finance Association (AFFI)*.

Corrado, C. J. (1989). A nonparametric test for abnormal security-price performance in event studies. *Journal of Financial Economics*, *23*(2), 385–395.

Cowan, A. R. (1992). Nonparametric event study tests. *Review of Quantitative Finance and Accounting*, *2*(4), 343–358.

Cruz, B. S. (2020). Asia-Pacific sees strong momentum towards green finance despite pandemic. *The Asset*. https://www.theasset.com/article-esg/41805/asia-pacific-sees-strong-momentum-towards-green-finance-despite-pandemic

Da, Z., Engelberg, J., & Gao, P. (2011). In search of attention. *The Journal of Finance*, *66*(5), 1461–1499.

David, J. D., & Vassil, T. (2003). The choice among bank debt, non-bank private debt, and public debt: Evidence from new corporate borrowings. *Journal of Financial Economics*, *70*(1), 3–28.

Demers, E., Hendrikse, J., Joos, P., & Lev, B. (2021). ESG did not immunize stocks during the COVID19 crisis, but investments in intangible assets did. *Journal of Business Finance and Accounting*, *48*(3-4), 433–462.

Diamond, D. W. (1991). Monitoring and reputation: The choice between bank loans and directly placed debt. *Journal of Political Economy*, *99*(4), 689–721.

Donaldson, T., & Preston, L. E. (1995). The stakeholder theory of the corporation: Concepts, evidence, and implications. *Academy of Management Review*, *20*(1), 65–91.

Dorfleitner, G., Utz, S., & Wimmer, M. (2018). Patience pays off: Corporate social responsibility and long-term stock returns. *Journal of Sustainable Finance and Investment*, *8*(2), 132–157.

Edmans, A. (2011). Does the stock market fully value intangibles? employee satisfaction and equity prices. *Journal of Financial Economics*, *101*(3), 621–640.

El Ouadghiri, I., Guesmi, K., Peillex, J., & Ziegler, A. (2021). Public attention to environmental issues and stock market returns. *Ecological Economics*, *180*, 106836.

Fama, E. F. (1998). Market efficiency, long-term returns, and behavioral finance. *Journal of Financial Economics*, *49*(3), 283–306.

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.

Fama, E. F. (1980). Agency problems and the theory of the firm. *Journal of Political Economy*, *88*(2).

Fatemi, A., Glaum, M., & Kaiser, S. (2018). ESG performance and firm value: The moderating role of disclosure. *Global Finance Journal*, *38*, 45–64.

Fields, L. P., Fraser, D. R., Berry, T. L., & Byers, S. (2006). Do bank loan relationships still matter? *Journal of Money, Credit and Banking*, *38*(5), 1195–1209.

Financial Times. (2021). *Carney takes aim at EU's rigid green regulation plans. Financial Times*. https://www.ft.com/content/b596022d-71ff-4e64-a994-ca3f6fb075f1

Fisher-Vanden, K., & Thorburn, K. S. (2011). Voluntary corporate environmental initiatives and shareholder wealth. *Journal of Environmental Economics and Management*, *62*(3), 430–445.

Flammer, C. (2012). Corporate social responsibility and shareholder reaction: The environmental awareness of investors. *Review of Quantitative Finance and Accounting*, *56*(3), 758–781.

Flammer, C. (2021). Corporate green bonds. *Journal of Financial Economics*.

Freeman, R. (1984). *Strategic management: A stakeholder approach*. Boston: Pitman.

Friedman, M. (1970). The social responsibility of business is to increase its profits. *New York Times Magazine*.

Guenther, E., Guenther, T., Schiemann, F., & Weber, G. (2016). Stakeholder relevance for reporting: Explanatory factors of carbon disclosure. *Business and Society*, *55*(3), 361–397.

Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica*, *47*(1), 153.

Hsueh, L. (2019). Opening up the firm: What explains participation and effort in voluntary carbon disclosure by global businesses? an analysis of internal firm factors and dynamics. *Business Strategy and the Environment*, *28*(7), 1302–1322.

Irwin, O., Marin, F. J. R., & Tonkin, M. (2020). Green loans and sustainability linked loans: New guidance to the Green Loan Principles and Sustainability Linked Loan Principles jointly issued by the LMA, the LSTA and the APLMA. *Lexology*. https://www.lexology.com/library/detail.aspx?g=09c594f1-4cd8-4cdd-a5e1-ad3663cd3fbd

Jacobs, B. W., Singhal, V. R., & Subramanian, R. (2010). An empirical investigation of environmental performance and the market value of the firm. *Journal of Operations Management*, *28*(5), 430–441.

Jamali, D. (2008). A stakeholder approach to corporate social responsibility: A fresh perspective into theory and practice. *Journal of Business Ethics*, *82*, 213–231.

Jensen, M. C. (2001). Value maximization, stakeholder theory, and the corporate objective function. *European Financial Management*, *7*(3), 297–317.

Khanna, M., Koss, P., Jones, C., & Ervin, D. (2007). Motivations for voluntary environmental management. *Policy Studies Journal*, *35*(4), 751–772.

Kolari, J. W., & Pynnönen, S. (2011). Nonparametric rank tests for event studies. *Journal of Empirical Finance*, *18*(5), 953–971.

Kothari, S. P., & Warner, J. B. (2007). Handbook of empirical corporate finance. Elsevier.

Krüger, P. (2015). Corporate goodness and shareholder wealth. *Journal of Financial Economics*, *115*(2), 304–329.

Lee, K. W., & Sharpe, I. G. (2008). Does a bank's loan screening and monitoring matter? *Journal of Financial Services Research*, *35*(1), 33.

Lennox, C. S., Francis, J. R., & Wang, Z. (2012). Selection models in accounting research. *The Accounting Review*, *87*(2), 589–616.

Lins, K. V., Servaes, H., & Tamayo, A. (2017). Social capital, trust, and firm performance: The value of corporate social responsibility during the financial crisis. *The Journal of Finance*, *72*(4), 1785–1824.

Loan Market Association. (2018). Green Loan Principles. https://www.lma.eu.com/application/files/9115/4452/5458/741_LM_Green_Loan_Principles_Booklet_V8.pdf

Loan Market Association. (2019). Sustainability-linked Loan Principles. https://www.icmagroup.org/assets/documents/Regulatory/Green-Bonds/LMASustainabilityLinkedLoanPrinciples-270919.pdf

Loughran, T., & Ritter, J. R. (1995). The new issues puzzle. *The Journal of Finance*, *50*(1), 23–51.

Lummer, S. L., & McConnell, J. J. (1989). Further evidence on the bank lending process and the capital-market response to bank loan agreements. *Journal of Financial Economics*, *25*(1), 99–122.

Luo, L., Lan, Y., & Tang, Q. (2012). Corporate incentives to disclose carbon information: Evidence from the CDP Global 500 report. *Journal of International Financial Management and Accounting*, *23*(2), 93–120.

Lyon, J. D., Barber, B. M., & Tsai, C. (1999). Improved methods for tests of long-run abnormal stock returns. *The Journal of Finance*, *54*(1), 165–201.

MacKinlay, A. C. (1997). Event studies in economics and finance. *Journal of Economic Literature*, *35*(1), 13–39.

Marshall, A., McCann, L., & McColgan, P. (2019). The market reaction to debt announcements: UK evidence surrounding the global financial crisis. *The British Accounting Review*, *51*(1), 92–109.

McWilliams, A., & Siegel, D. (1997). Event studies in management research: Theoretical and empirical issues. *Academy of Management Journal*, *40*(3), 626–657.

Ng, A. C., & Rezaee, Z. (2020). Business sustainability factors and stock price informativeness. *Journal of Corporate Finance*, *64*, 101688.

Oberndorfer, U., Schmidt, P., Wagner, M., & Ziegler, A. (2013). Does the stock market value the inclusion in a sustainability stock index? An event study analysis for German firms. *Journal of Environmental Economics and Management*, *66*(3), 497–509.

Palmer, K., Oates, W. E., & Portney, P. R. (1995). Tightening environmental standards: The benefit-cost or the no-cost paradigm? *Journal of Economic Perspectives*, *9*(4), 119–132.

Papadamou, S., Fassas, A., Kenourgios, D., & Dimitriou, D. (2020). Direct and indirect effects of COVID-19 pandemic on implied stock market

volatility: Evidence from panel data analysis. *MPRA Paper*, (100020). https://mpra.ub.uni-muenchen.de/100020/

Preece, D., & Mullineaux, D. J. (1996). Monitoring, loan renegotiability, and firm value: The role of lending syndicates. *Journal of Banking and Finance*, *20*(3), 577–593.

Ramchander, S., Schwebach, R. G., & Staking, K. I. M. (2012). The informational relevance of corporate social responsibility: Evidence from ds400 index reconstitutions. *Strategic Management Journal*, *33*(3), 303–314.

Ramelli, S., & Wagner, A. F. (2020). Feverish stock price reactions to COVID-19. *The Review of Corporate Finance Studies*, *9*(3), 622–655.

Refinitiv. (2021). *Environmental, Social, and Governance (ESG) Scores from Refinitiv*. https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

Refinitiv LPC. (2021). *Sustainable Finance Review*. http://resourcehub.refinitiv.com/c/Sustainablefinance_reviewQ4?x=uxxWju&elqTrackId=27540b162d27455c9f00c7a41d6af055&elqaid=11153&elqat=2

Reid, E. M., & Toffel, M. W. (2009). Responding to public and private politics: Corporate disclosure of climate change strategies. *Strategic Management Journal*, *30*(11), 1157–1178.

Ritter, J. R. (1991). The long-run performance of initial public offerings. *The Journal of Finance*, *46*(1), 3–27.

Schöber, T. (2008). *Buyout-backed initial public offerings* (Doctorate). The University of St.Gallen. Switzerland.

S&P Global. (2021). *Environmental, Social, And Governance: How Sustainability-Linked Debt Has Become A New Asset Class*. https://www.spglobal.com/ratings/en/research/articles/210428-how-sustainability-linked-debt-has-become-a-new-asset-class-11930349

Strong, N. (1992). Modelling abnormal returns: A review article. *Journal of Business Finance and Accounting*, *19*, 533–553.

Tang, D. Y., & Zhang, Y. (2020). Do shareholders benefit from green bonds? *Journal of Corporate Finance*, *61*, 101427.

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.

Webb, M. S. (2021). Even non-ESG funds now have a greenish tinge. *Financial Times*. https://www.ft.com/content/7dd96b6d-26f5-48ed-b710-465f9fe5378d

Wilkins, M., & Bendersky, C. B. (2019). *Why linking loans to sustainability performance is taking off. S&P Global Ratings.* https://www.icmagroup.org/assets/documents/Sustainable-finance/Public-research/Why-Linking-Loans-To-Sustainability-Performance-Is-Taking-Off-Sept-3-2019-110521.pdf

Wooldridge, J. M. (2015). *Introductory econometrics: A modern approach*. Cengage learning.

Zhang, J. Q., Zhu, H., & Ding, H. (2013). Board composition and corporate social responsibility: An empirical investigation in the post Sarbanes-Oxley era. *Journal of Business Ethics*, *114*(3), 381–392.

A APPENDIX

A.1 Statistical Tests for Event Study

We used annotations from Boehmer et al. (1991) and Kolari and Pynnönen (2011) to develop this section. The test statistics for both approaches were used to test the null hypothesis that CAAR = 0.
The main variables are defined as below.

N	Number of firms
t	Event window
T	Estimation window
AR_{it}	Abnormal returns of firm i on day t
CAR_i	Cumulative abnormal return for firm i
$CAAR_i$	Cumulative average abnormal return of firm i
R_{mt}	Market expected return on day t
$\overline{R}_m$	Average market return during the estimation window
S_i	Standard deviation of abnormal returns during the estimation window for firm i
S_{CAAR_i}	Standard deviation of cumulative abnormal returns during the estimation window for firm i
S_{CSAR_i}	Standard deviation of cumulative standardized abnormal returns during the estimation window for firm i
$\overline{StCSAR_i}$	Standard deviation of average cumulative standardized residual on the event day for firm i
SAR_i	Standardized residual on the event day for firm i
$CSAR_i$	Cumulative standardized residual on the event day for firm i
$\overline{CSAR_i}$	Average cumulative standardized residual on the event day for firm i

A.1.1 Standardized Cross-sectional Test (Boehmer et al. (1991))

Abnormal returns are first standardized as follows:

$$SAR_i(t_1, t_2) = \frac{AR_i(t_1, t_2)}{S_i}. \tag{A.10}$$

Subsequently, these standardized abnormal returns are cumulated over time as follows:

$$CSAR_i(t_1, t_2) = \sum_{t=t_1}^{t_2} SAR_{it}(t_1, t_2). \tag{A.11}$$

The test then uses the cross-sectional average $CSAR_i$ and the standard deviation of $\overline{CSAR_i}$:

$$z_{BMP,t} = \sqrt{N}\,\frac{\overline{SCAR}}{\overline{S_{SCAR}}}, \tag{A.12}$$

where $\overline{SCAR}$ is the averaged standardized cumulated abnormal returns across the N firms, with the standard deviation

$$\overline{S_{SCAR}}^2 = \frac{1}{N-1}\sum_{i=1}^{N}(SCAR_i - \overline{SCAR})^2. \tag{A.13}$$

A.1.2 Generalized Rank Test (Kolari and Pynnönen (2011))

Following the logic of the Boehmer et al. (1991) test and other common practice in parametric testing, GRANK test re-standardized the SCARs with the cross-sectional standard deviation, which is noted as:

$$CSAR_i^* = \frac{SCAR_i}{S_{SCAR}}, \tag{A.14}$$

where

$$S_{SCAR}{}^2 = \frac{1}{N-1}\sum_{i=1}^{N}(SCAR_i - \overline{SCAR})^2. \tag{A.15}$$

The $SCAR^*$ then has been constructed to have a zero mean and unit variance. Thus, we use it as the abnormal return and define generalized abnormal returns:

$$GSAR_{it} = \begin{cases} SCAR_i^* & \text{for t in the Event Window} \\ SAR_{it} & \text{for t in the Estimation Window.} \end{cases} \tag{A.16}$$

Define on the T points the standardized ranks of the generalized standardized abnormal returns:

$$U_{it} = \frac{rank(GSAR_{it})}{T+1} - 0.5. \tag{A.17}$$

Then the generalized rank test statistic is defined as:

$$t_{GRANK} = Z\,(\frac{T-2}{T-1-Z^2})^{1/2}, \tag{A.18}$$

where

$$Z = \frac{\overline{U_0}}{S_{\overline{U}}}, \tag{A.19}$$

with

$$S_{\overline{U}} = \sqrt{\frac{1}{T}\sum_{t\in T}\frac{N_t}{N}\overline{U}_t^2}, \tag{A.20}$$

and

$$\overline{U}_t = \frac{1}{N_t}\sum_{i=1}^{N_t} U_{it}. \tag{A.21}$$

A.2 Robustness Test for Event Study

A.2.1 Fama-French Three-Factor Model

This model regresses the excess return $R_{it} - R_{ft}$ on the three factors MKT, SMB, HML.

$$R_{it} - R_{ft} = \alpha_i + \beta_{1i}\,(R_{mt} - R_{ft}) + \beta_{2i}\,SMB_t + \beta_{3i}\,HML_t + \epsilon_{it}, \tag{A.22}$$

where $R_{mt} - R_{ft}$ represents the excess return on the market, SMB_t represents the size factor, and HML_t is the value factor in day t. ϵ is the residual term.

$E[R_{it} - R_{ft}]$ is therefore estimated from the regression, equaling

$$E[R_{it} - R_{ft}] = (R_{it} - R_{ft}) - (\hat{\alpha_i} + \hat{\beta_{1i}}\,(R_{mt} - R_{ft}) + \hat{\beta_{2i}}\,SMB_t + \hat{\beta_{3i}}\,HML_t). \tag{A.23}$$

The abnormal return is the difference between the actual excess return and the estimated excess return using the Fama-French Factor model. We then calculate the abnormal return of firm i and on day t as follows:

$$AR_{it} = R_{it} - R_{ft} - E[(R_{it} - R_{ft}]. \tag{A.24}$$

The following process is the same as the market model. The CARs would be calculated by summing up ARs within the event window interval:

$$CAR_i(T_1, T_2) = \sum_{t=T_1}^{T_2} AR_{it}. \tag{A.25}$$

And the estimated CAAR across the 124 sample firms will be calculated:

$$CAAR(T_1, T_2) = \frac{1}{N}, \sum_{i=1}^{N} CAR_i(T_1, T_2). \tag{A.26}$$

A.2.2 Robustness Test Results

Table 11: Robustness

The table reports the CAAR (%) for full sample and subsamples shown in Table 7 with global market model based on MSCI Index (Robostness A) and global three-factor model based on Fama-French Factors (Robustness B), respectively. Column (2) and (5)report the test-statistics of the Standardized Cross-sectional Test (also known as the BMP Test) developed by Boehmer et al. (1991). Column (3) and (6) report the test-statistics of the Generalized Rank Test (also known as the GRANK Test) developed by Kolari and Pynnönen (2011). *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively.

	N	CAAR(%) (1)	BMP Test (2)	GRANK Test (3)
Robustness A. MSCI Index				
Panel A. Full Sample	124	-1.147	-2.332***	-4.195***
Panel B. EU Country vs. non-EU country				
Loan issuance in EU country	79	-1.421	-2.277**	-3.622***
Loan issuance in non-EU country	45	-0.666	-0.713	-1.359
Panel C. Renewed vs. new loan				
Renewed issuance	61	-0.582	-0.423	-1.789*
New issuance	63	-1.694	-2.553***	-3.557***
Panel D. Certified vs. non-certified loan				
Certified issuance	29	-0.843	-0.49	-0.517
Non-certified issuance	95	-1.24	-2.325**	-4.229***
Panel E. Before COVID vs. After COVID				
Before COVID	79	-0.334	-1.124	-1.219
After COVID	45	-2.574	-2.104**	-3.784***
Robustness B. Fama-French Factors				
Panel A. Full Sample	124	-1.389	-2.803***	-5.561***
Panel B. EU Country vs. non-EU country				
Loan issuance in EU country	79	-1.735	-2.554***	-4.281***
Loan issuance in non-EU country	45	-0.781	-1.167	-2.551***
Panel C. Renewed vs. new loan				
Renewed issuance	61	-1.096	-1.169	-3.536***
New issuance	63	-1.672	-2.596***	-3.639***
Panel D. Certified vs. non-certified loan				
Certified issuance	29	-0.913	-0.611	-0.328
Non-certified issuance	95	-1.534	-2.81***	-6.087***
Panel E. Before COVID vs. After COVID				
Before COVID	79	-0.403	-1.239	-1.845*
After COVID	45	-3.119	-2.637***	-5.051***

A.3 Event Study Results (115 Observations)

Table 12: Stock Market Reaction to the Announcement of 115 Sustainable Loan Issuance (Market Model)

The table reports the CAAR (%) for 115 loans borrowed by firms in Section 6 for full sample and four subsamples using the market model using local country indices. Column (2) reports the test-statistics of the Standardized Cross-sectional Test (also known as the BMP Test) developed by Boehmer et al. (1991), and Column (3) reports the test-statistics of the Generalized Rank Test (also known as the GRANK Test) developed by Kolari and Pynnönen (2011). **, and *** denotes significance at the 10%, 5%, and 1% level, respectively.

	N	**CAAR(%)** (1)	**BMP Test** (2)	**GRANK Test** (3)
Panel A. Full Sample	115	-0.921	-2.304**	-3.506***
Panel B. EU Country vs. non-EU country				
Loan issuance in EU country	72	-1.277	-2.327**	-3.712***
Loan issuance in non-EU country	43	-0.326	-0.622	0.075
Panel C. Renewed vs. new loan				
Renewed issuance	58	-0.811	-1.036	-0.843
New issuance	57	-1.034	-2.090**	-3.791***
Panel D. Certified vs. non-certified loan				
Certified issuance	25	-1.077	-0.956	-1.565
Non-certified issuance	90	-0.878	-2.092**	-3.050***
Panel E. Before COVID vs. After COVID				
Before COVID	77	-0.517	-1.849*	-2.813***
After COVID	38	-1.740	-1.428	-1.670*

Table 13: Stock Market Reaction to the Announcement of 115 Sustainable Loan Issuance (Robust Models)

The table reports the CAAR (%) for 115 loans borrowed by firms in Section 6 for full sample and four subsamples using global market model based on MSCI Index and global three-factor model based on Fama-French Factors, respectively. Column (2) and (5) report the test-statistics of the Standardized Cross-sectional Test (also known as the BMP Test) developed by Boehmer et al. (1991). Column (3) and (6) report the test-statistics of the Generalized Rank Test (also known as the GRANK Test) developed by Kolari and Pynnönen (2011). **, and *** denotes significance at the 10%, 5%, and 1% level, respectively.

	N	**CAAR(%)** (1)	**BMP Test** (2)	**GRANK Test** (3)
Robustness A. MSCI Index				
Panel A. Full Sample	115	-1.319	-2.666***	-5.129***
Panel B. EU Country vs. non-EU country				
Loan issuance in EU country	72	-1.581	-2.444***	-4.051***
Loan issuance in non-EU country	43	-0.880	-1.090	-1.972**
Panel C. Renewed vs. new loan				
Renewed issuance	58	-0.727	-0.738	-2.049**
New issuance	57	-1.921	-2.744***	-4.437***
Panel D. Certified vs. non-certified loan				
Certified issuance	25	-1.384	-1.174	-2.028**
Non-certified issuance	90	-1.301	-2.394***	-4.313***
Panel E. Before COVID vs. After COVID				
Before COVID	77	0.576	-1.852*	-3.166***
After COVID	38	-2.823	-1.949*	-2.957***
Robustness B. Fama-French Factors				
Panel A. Full Sample	115	-1.553	-3.109***	-6.450***
Panel B. EU Country vs. non-EU country				
Loan issuance in EU country	72	-1.915	-2.717***	-4.539***
Loan issuance in non-EU country	43	-0.947	-1.540	-3.272***
Panel C. Renewed vs. new loan				
Renewed issuance	58	-1.246	-1.509	-3.901***
New issuance	57	-1.865	-2.746***	-4.161***
Panel D. Certified vs. non-certified loan				
Certified issuance	25	-1.552	-1.306	-1.91*
Non-certified issuance	90	-1.553	-2.812***	-5.934***
Panel E. Before COVID vs. After COVID				
Before COVID	77	-0.572	-1.9*	-3.376***
After COVID	38	-3.541	-2.508***	-4.365***

A.4 Cross-sectional Analysis

A.4.1 Pearson Correlation

Table 14: Pearson Correlation Coefficients

CAR *(CAR)* is the cumulative abnormal returns over 11-day event window from market model in Section 5.1. COVID *(COVID)* is a dummy variable set equal to 1 if the announcement is made after the global market crash on 24th February 2020. Google Search Volume *(GSV)* is median monthly search index downloaded from Google Trends over the 12 months ending in the month before the announcement. Firm size *(SIZE)* is the variable indicating the size of the firm and is measured by the natural logarithm of the firm's total assets. Market-to-book ratio *(MBratio)* is the market value of equity plus book value of total debt divided by total assets. Return on assets *(ROA)* is the ratio of net income after tax to the book value of total assets. *E_SCORE, S_SCORE*, and *G_SCORE* are three ESG pillar scores from Refinitiv. Board size *(BOARDSIZE)* is the total number of directors serving on the board. Gender diversity *(FEMALE)* is the percentages of female directors presented on board of director. Inverse Mills ratio *(IMR)* is estimated from the first stage probit model in Heckman two-stage selection model. * denotes significance at the 5% level.

Variables	CAR	COVID	GSV	SIZE	MBratio	ROA	E_SCORE	S_SCORE	G_SCORE	BOARDSIZE	FEMALE	IMR
CAR	1											
COVID	-0.128*	1										
GSV	0.147*	0.238*	1									
SIZE	-0.141*	0.062*	0.192*	1								
MBratio	-0.009	-0.047	0.119*	-0.062*	1							
ROA	0.115*	-0.119*	0.096*	-0.024	0.101*	1						
E_SCORE	-0.088*	-0.102*	-0.074*	0.531*	-0.130*	0.077*	1					
S_SCORE	-0.032	-0.075*	-0.035	0.488*	-0.014	0.108*	0.636*	1				
G_SCORE	0.015	-0.084*	-0.099*	0.406*	-0.122*	0.176*	0.335*	0.397*	1			
BOARDSIZE	-0.297*	-0.030	0.031	0.530*	-0.094*	-0.123*	0.199*	0.155*	0.026	1		
FEMALE	-0.110*	-0.123*	0.020	0.055	0.113*	0.116*	0.067	0.098*	0.118*	0.074*	1	
IMR	-0.053	0.050	-0.193*	-0.168*	-0.030	-0.072*	-0.593*	-0.537*	-0.092*	0.157*	-0.523*	1

A.4.2 Variance Inflation Factors

Table 15: Variance Inflation Factor

CAR *(CAR)* is the cumulative abnormal returns over 11-day event window from market model in Section 5.1. COVID *(COVID)* is a dummy variable set equal to 1 if the announcement is made after the global market crash on 24th February 2020. Google Search Volume *(GSV)* is median monthly search index downloaded from Google Trends over the 12 months ending in the month before the announcement. Firm size *(SIZE)* is the variable indicating the size of the firm and is measured by the natural logarithm of the firm's total assets. Market-to-book ratio *(MBratio)* is the market value of equity plus book value of total debt divided by total assets. Return on assets *(ROA)* is the ratio of net income after tax to the book value of total assets. *E_SCORE, S_SCORE*, and *G_SCORE* are three ESG pillar scores from Refinitiv. Board size *(BOARDSIZE)* is the total number of directors serving on the board. Gender diversity *(FEMALE)* is the percentages of female directors presented on board of director. Inverse Mills ratio *(IMR)* is estimated from the first stage probit model in Heckman two-stage selection model.

Variable	VIF	1/VIF
IMR	5.44	0.184
E_SCORE	3.42	0.292
FEMALE	2.49	0.402
S_SCORE	2.43	0.411
SIZE	2.30	0.435
BOARDSIZE	2.26	0.443
G_SCORE	1.72	0.580
GSV	1.31	0.764
ROA	1.12	0.895
MBratio	1.09	0.921
COVID	1.09	0.921
Mean VIF	2.24	