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경영학석사 학위논문

The choice between bank loans
and public debt in the
sustainability-linked debt market

지속가능성연계부채 시장에서의
기업의 자본 조달 선택

2023년 2월

서울대학교 대학원

경영학과 재무금융 전공

구 가 영

The choice between bank loans and public debt in the sustainability-linked debt market

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이 논문을 경영학석사 학위논문으로 제출함
2022년 10월

서울대학교 대학원
경영학과 재무금융 전공
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구가영의 경영학석사 학위논문을 인준함
2022년 12월

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Abstract

Conventionally, a firm's choice between bank loan and public debt depends on the trade-off between enduring bank's monopoly rent and inefficient bond covenants. Small and opaque firms tend to stay with the informed relationship banks despite the banks' rent extraction threat, while large firms could borrow from the less informed arm's-length creditors. I test whether such trade-off exists in the newly emerging sustainability-linked debt markets where borrowers' environmental, social, and governance (ESG) profile uncertainty prevails. Using the novel sustainability-linked bonds (SLBs) and loans (SLLs) sample from 2017 to 2021, I confirm that bond covenants on the key performance indicators (KPIs) of the borrowers' ESG activities are disclosed in a more granular and rigid fashion than loan covenants. The size of a firm as a proxy for the borrower's relative bargaining power against the bank is also related to the firm's preference of SLBs over SLLs. Importantly, I find that SLL covenant intensity is U-shaped in the degree of banking relationship; with the repeated lending relationship, covenant intensity reduces but then increases as the borrowers' concerns arise regarding the lenders' monopolistic rent extraction. Large borrowers are more concerned with signaling their ESG commitment and tend to write intense covenants using third-party ESG ratings as KPIs. Overall, I confirm that conventional banking theory holds in ESG banking, which emerges as an important external financing venue in the era of rising ESG risks around the globe.

Keyword : Sustainability-linked loans, Sustainability-linked bonds, ESG, Covenants, Bank relationship

Student Number : 2021-29487

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1 Introduction

The traditional view of a firm’s optimal choice between bank loan and public debt depends on the trade-off between enduring bank’s monopoly rent and inefficient bond covenants (Berlin and Loeys, 1988; Rajan, 1992). Since banks have a comparative advantage in acquiring borrowers’ financial information as delegated monitors (Diamond, 1984), relationship banks can extract rents from their borrowers through the lending experience due to the information asymmetry with non-lenders (Fama, 1985). Public debt covenants are inefficient in that they tend to be too harsh or too lenient depending on borrowers (Berlin and Loeys, 1988; Rauh and Sufi, 2010; Nini et al., 2012). Thus, small and opaque firms tend to stay with the informed relationship banks despite the banks’ rent extraction threat, while large firms could borrow from the less informed arm’s-length creditors. (Houston and James, 1996).

This paper tests whether such trade-off exists in the newly emerging sustainability-linked debt markets where borrowers’ environmental, social, and governance (ESG) profile uncertainty prevails. Sustainability-linked loans (SLLs) and sustainability-linked bonds (SLBs) refer to general-purpose loans and bonds whose interest rates are contractually tied to the borrower’s ex-post ESG performance (Kim et al, 2022). For example, Ford Motor Company entered into a sustainability-linked loan contract in 2021, and the pricing terms were tied to three targets: reducing carbon emissions, using renewable energy and reducing emissions from its vehicles in Europe. These markets are rapidly growing (Kim et al, 2022; Kolbel et al., 2022), and are prevalent across the world. Sustainability-linked loans are now issued in 60 countries and sustainability-linked bonds are present in 38 countries. Moreover, there is a growing concern related to ESG investment among investors (Krueger et al., 2020; Stroebl and Wurgler, 2021; Bolton and Kacperczyk, 2021; Bauer et al., 2021; Flammer, 2021). Although there is a growing research interest in green bonds (Tang and Zhang, 2020; Flammer, 2021; Baker et al., 2022; Pietsch and Salakhova, 2022), little is discovered in the sustainability-linked debt market. And existing literature focuses on their pricing (Berrada et al., 2022; Kolbel and Lambillon, 2022). Thus, I document the comprehensive contractual

features of sustainability-linked loans and bonds and explore whether conventional banking theory holds in ESG banking, which emerges as an important external financing venue in the era of rising ESG risks around the globe.

Using the novel sustainability-linked bonds and loans sample from 2017 to 2021, I confirm that bond covenants on the key performance indicators (KPIs) of the borrowers' ESG activities are disclosed in a more granular and rigid fashion than loan covenants. Although sustainability-linked loans and bonds have the same underlying mechanisms in that their interest rates are linked to ESG performance, they show significant differences regarding disclosure intensity and covenant rigidity. Using textual descriptions from DealScan and Bloomberg, supplemented with manual search of media releases, I compare the disclosure intensity and covenant rigidity by assigning quantitative values to qualitative assessments of key performance indicators. While 96% of sustainability-linked bonds disclose their KPIs in detail, only 58% of sustainability-linked loans do. Moreover, KPIs on sustainability-linked bonds are more rigid in that they generally use penalty-driven contracts, while loans write incentive-driven contracts. Also, they are more linked to environmental terms, which are the most costly to achieve among environmental, social and governance terms. In sum, in the sustainability-linked debt market, firms face a decision between enduring the control of banks and strict bond covenants.

I next examine whether the size of a firm is also related to the firm's preference for sustainability-linked bonds over sustainability-linked loans. Conventionally, firm size is a key determinant of the firm's choice between loans and bonds since it can be interpreted as a proxy for the borrower's relative bargaining power against the bank (Houston and James, 1996). By comparing the borrower size in three groups, firms using sustainability-linked loans only, sustainability-linked bonds only, and using a mix of them, I find that firms with mixed usage of SLLs and SLBs are greater more than double in their size.

I also conduct an analysis on covenant intensity and lending relationship in the sustainability-linked loan market. I find that SLL covenant intensity is U-shaped in the degree of the bank-

ing relationship, and such relation is significant only with the sustainability-linked lending relationship. Repeated lending relationships reduce covenant intensity as information asymmetry is solved between lenders and borrowers. But then the covenant intensity increases as the borrowers' concerns arise regarding the lenders' monopolistic rent extraction. While several theories discuss the banking relationship and the monopoly rent extraction, they disagree on how the direction should be. Relationship with a bank is positively related to the exploitation of borrower due to the hold-up effect (Rajan, 1992; Sharpe, 1990; Greenbaum et al., 1989), or they are negatively related as information asymmetry with non-lender solves (Garleanu and Zwiebel, 2009). They can also have a U-shaped relation (Schenone, 2010), or an inverted U-shape (Prilmeier, 2017) depending on which forces dominate at each stage of the relationship. My paper is consistent with Schenone(2010), showing a U-shaped relation between bank extraction and relationship intensity. Additionally, I empirically find that such relationship is significant only for large borrowers and those large borrowers tend to write intense covenants such as third-party ESG ratings as their KPIs, which implies that they are more concerned with signaling their ESG commitment.

Overall, I confirm that conventional banking theory holds in the sustainability-linked debt market, which appears to be an important external financing venue. My study complements recent work on sustainability-linked loans and bonds (Kim et al, 2022; Carrizosa and Ghosh, 2022; Kolbel and Lambillon, 2022; Berrada et al., 2022) by suggesting an exhaustive analysis of their contractual features and exploring firm's optimal financing decision.

The remainder of the paper is organized as follows. Section 2 describes the data on sustainability-linked loans and bonds. Section 3 presents the characteristics of borrowers. Section 4 describes the analysis of lending relationships and contract intensity. Finally, section 5 concludes.

2 Data

I use loan data from Refinitive DealScan and bond data from Bloomberg’s fixed income database. Using DealScan market segment, I classify sustainability-linked loan when it indicates that the facility is “Environmental, Social & Governance/Sustainability-linked” and green loan when it indicates that the facility is “Green loan”. With Bloomberg, I use the “Green bond indicator” and “Sustainability-linked bond indicator” to classify bonds. In the universe of sustainability-linked bonds, Schuldscheine are excluded, which are closer to loans and often duplicated in both universes. 1,707 sustainability-linked loans and 1,590 green loans are covered over the sample period from 2017 to 2021. Also, I identify 242 sustainability-linked bonds from 2018 to 2021 and 5,467 green bonds from 2008 to 2021. Green bonds were essentially in-existent prior to 2013, as mentioned in Flammer (2021).

The financial data of US borrowers are from Compustat, and I use Worldscope database for international borrowers. Since there are a large number of unlisted firms in the sample, I use Capital IQ for firms whose financial information is not available from Compustat and Worldscope. I identify lenders of each loan from DealScan and define lead arrangers following Cai et al. (2018).

Table 1 provides the summary statistics of yearly sustainability-linked and green debt issuance. The ESG lending activity has increased dramatically, where the loan totaled 1,158 billion dollars and the bond issuance amounted to 1,397 billion dollars during the whole sample period. Moreover, sustainability-linked loans and sustainability-linked bonds show rapid growth since their first issuance, especially after 2020 when there was a Covid-19 pandemic. Sustainability-linked loans are issued more than green loans, whereas the green bond market is much greater than that of sustainability-linked bonds. Comparing the average amount issued, the size of the sustainability-linked loan and bond is greater than the size of the green debt.

Table 2 reports the distribution of sustainability lending activities across the borrower’s country of incorporation. I find that sustainability-linked and green instruments are spread

Table 1: Sustainability lending over time

This table reports the summary statistics of sustainability-linked and green debt issuance by year. The total issuance amount(in billion dollars) and number of issuance are presented from 2008 to December 2021. The sample consists of 1,707 sustainability-linked and 1,590 green loans obtained from DealScan and 242 sustainability-linked and 5,467 green bonds from Bloomberg. The average amount is also reported in billion dollars.

	Sustainability-linked+Green			Sustainability-linked			Green		
Panel A: Loans									
Year	\$ billion	# facility	\$ mean	\$ billion	# facility	\$ mean	\$ billion	# facility	\$ mean
2016	6.2	105	0.06				6.2	105	0.06
2017	12.0	106	0.11	2.6	5	0.51	9.5	101	0.09
2018	71.9	196	0.37	50.0	66	0.76	21.9	130	0.17
2019	189.4	513	0.37	143.1	250	0.57	46.3	263	0.18
2020	251.4	848	0.30	177.2	372	0.48	74.2	476	0.16
2021	627.7	1,529	0.41	536.8	1,014	0.53	90.8	515	0.18
Total	1,158.6	3,297		909.7	1,707		248.9	1,590	
Panel B: Bonds									
Year	\$ billion	# facility	\$ mean	\$ billion	# facility	\$ mean	\$ billion	# facility	\$ mean
before 2016	62.4	872	0.03				62.4	872	0.03
2017	109.6	451	0.24				109.6	451	0.24
2018	111.7	561	0.20	0.2	1	0.19	111.6	560	0.20
2019	227.2	809	0.28	3.9	4	0.97	223.3	805	0.28
2020	251.7	1,012	0.25	7.8	19	0.41	243.9	993	0.25
2021	634.6	2,004	0.31	87.5	218	0.40	547.1	1,786	0.31
Total	1,397.2	5,709		99.4	242		1,297.8	5,467	

across the world, while they are most prevalent in the countries of Western Europe such as France, the United Kingdom, Spain, Germany, Italy, Netherlands. The United States is the single largest country in issuing sustainability-linked loans, issuing 20% of the total market. However, the share of the US in the sustainability-linked bond market is comparably lower. Singapore, Japan, and Hong Kong also widely use sustainability-linked lending. And China is the leading country in the sustainability-linked and green bonds market.

In appendix A.1., sustainability lending by continent level is available. European countries issue about 63% of the total amount and countries in North America follow next, amounting to 22%. Sustainability-linked loans were first issued in 2017 in Netherlands, and they are now issued in 60 countries in total. Meanwhile, sustainability-linked bonds were first issued in 2018 in China and they are now present in 38 countries.

Table 2: Sustainability lending over time by country

This table reports the total issuance amount in billion dollars as well as the number of issuance by country. Panel A reports the summary statistics of sustainability-linked and green loans, and panel B summarizes the sustainability-linked and green bonds by country. My sample period is from 2008 to December 2021. The sample consists of 1,707 sustainability-linked and 1,590 green loans obtained from DealScan and 242 sustainability-linked and 5,467 green bonds from Bloomberg.

<i>Panel A: Loans</i>								
Sustainability-linked+Green loans			Sustainability-linked loans			Green loans		
Country	# facility	\$ billion	Country	# facility	\$ billion	Country	# facility	\$ billion
United States	393	225.3	United States	151	184.4	United States	242	40.9
France	229	123.2	France	169	108.6	United Kingdom	109	35.4
United Kingdom	214	100.9	Germany	142	71.0	Spain	140	18.6
Spain	385	82.8	Italy	77	66.5	Japan	282	17.8
Germany	192	77.9	United Kingdom	105	65.5	Singapore	82	15.5
Italy	141	73.6	Spain	245	64.3	Australia	96	15.4
Netherlands	86	55.4	Netherlands	65	53.6	France	60	14.6
Singapore	163	45.0	Singapore	81	29.5	Hong Kong	66	13.5
Japan	353	33.4	Sweden	30	24.1	Taiwan	71	13.4
Hong Kong	136	31.3	Belgium	21	18.9	Italy	64	7.1
Australia	152	30.2	Hong Kong	70	17.8	Germany	50	7.0
Sweden	56	27.9	Norway	19	16.5	Saudi Arabia	5	5.0
Taiwan	115	22.5	Switzerland	28	16.1	India	39	4.3
Belgium	34	20.9	Denmark	11	16.0	United Arab Emirates	14	4.0
Norway	26	17.1	Japan	71	15.6	Sweden	26	3.8
Switzerland	29	16.3	Australia	56	14.7	Canada	20	2.9
Denmark	14	16.2	Mexico	13	13.3	Luxembourg	14	2.9
Finland	43	14.1	Finland	32	11.5	Portugal	6	2.9
Mexico	16	13.9	Turkey	39	11.0	Finland	11	2.6
Luxembourg	27	12.7	Luxembourg	13	9.8	Belgium	13	2.0
Canada	34	12.5	Canada	14	9.6	China	13	1.9
Turkey	42	11.5	Taiwan	44	9.1	Netherlands	21	1.7
United Arab Emirates	26	10.7	Ireland	8	8.5	Tanzania	4	1.6
Ireland	11	9.2	Russian Federation	21	7.5	Egypt	1	1.5
Russian Federation	23	7.7	United Arab Emirates	12	6.8	Vietnam	21	1.3
India	41	5.3	Cayman Islands	2	5.3	Chile	12	1.1
Cayman Islands	2	5.3	Austria	29	4.4	Ireland	3	0.7
Saudi Arabia	5	5.0	Brazil	6	3.1	Norway	7	0.7
Austria	37	5.0	Cyprus	3	2.6	Virgin Islands (British)	1	0.6
Others	272	46.0	Others	130	24.2	Others	97	8.3
Total	3,297	1,158.6	Total	1,707	909.7	Total	1,590	248.9

In sum, sustainability-linked and green debt markets have shown rapid growth during the last few years across the world. Thus, it is important to explore those markets and analyze their contractual terms. This paper mainly focuses on the sustainability-linked debt market since various aspects appear due to the complexity of their contracts on key performance indicators. On the other hand, in green bonds and loans, the borrower's heterogeneity does not have a significant effect on the contract due to the simplicity that the use of proceeds should be used in the green project.

Table 2: Sustainability lending over time by country(continued)

<i>Panel B: Bonds</i>								
Sustainability-linked+Green bonds			Sustainability-linked bonds			Green bonds		
Country	# facility	\$ billion	Country	# facility	\$ billion	Country	# facility	\$ billion
France	465	180.7	Netherlands	25	21.6	France	441	170.3
Germany	628	164.1	France	24	10.4	Germany	620	161.1
China	754	138.5	Luxembourg	16	9.3	China	726	132.6
Netherlands	177	124.0	United States	12	7.2	United States	464	114.9
United States	476	122.1	Italy	11	6.7	Snat	613	103.7
Snat	613	103.7	China	28	6.0	Netherlands	152	102.5
Sweden	680	55.4	Britain	10	4.8	Sweden	668	53.7
Britain	101	53.8	Mexico	9	4.6	Britain	91	48.9
Italy	62	49.6	Austria	9	3.9	Spain	116	48.4
Spain	119	48.5	Germany	8	3.0	Canada	98	44.8
Canada	101	46.9	Australia	8	2.6	Japan	295	44.4
Japan	306	45.5	Canada	3	2.1	Italy	51	42.9
South Korea	195	34.1	Ireland	3	1.9	South Korea	195	34.1
Norway	202	33.3	Sweden	12	1.6	Norway	197	32.7
Luxembourg	75	26.9	Greece	3	1.6	Denmark	44	22.1
Denmark	44	22.1	Brazil	3	1.5	Hong Kong	69	20.7
Hong Kong	69	20.7	Japan	11	1.2	Belgium	27	20.4
Cayman Islands	72	20.5	Singapore	5	1.1	Cayman Islands	70	19.7
Belgium	27	20.4	India	3	1.0	Luxembourg	59	17.6
Ireland	21	19.0	Mult	1	0.9	Ireland	18	17.1
Australia	42	16.8	Cayman Islands	2	0.9	Australia	34	14.2
Finland	38	13.3	Ukraine	1	0.7	Finland	38	13.3
Chile	15	12.4	Poland	3	0.7	Chile	14	12.0
Austria	51	12.2	Norway	5	0.6	British Virgin	43	9.1
British Virgin	45	9.4	Thailand	6	0.6	Austria	42	8.3
India	44	8.5	Marshall Island	2	0.4	India	41	7.5
Singapore	33	8.1	Chile	1	0.4	Switzerland	47	7.5
Switzerland	47	7.5	British Virgin	2	0.3	Singapore	28	7.0
Mexico	22	6.5	Peru	1	0.3	Portugal	8	5.4
Others	575	75.9	Others	15	1.7	Others	548	64.2
Total	6,099	1,500.3	Total	242	99.4	Total	5,857	1,400.9

2.1 Key Performance Indicators (KPIs)

According to Roberts and Sufi (2007) and Nini et al. (2012), conventional debt writes covenants related to the firm’s credit risk, and covenant violations increase the bargaining power of the bank. And it leads to renegotiation resulting in the increase of interest rates, reduction of the size, or pressure to improve performances. On the other hand, covenants of sustainability-linked debts are special in that their interest rates are directly linked to the borrower’s ESG performance. For example, Ford Motor Company can reduce interest rates up to 1.5bps by achieving its key performance indicators: reduction in carbon emissions, use

of renewable energy, and reduction in emissions from its vehicles in Europe. Firms can also use third-party ratings as their KPIs. For instance, the pricing of RHI Magnesita GmbH is adjusted based on the company’s EcoVadis rating performance.

Table 3 summarizes Key Performance Indicators (KPIs) or Sustainability Performance Targets (SPTs) of sustainability-linked loans and sustainability-linked bonds. There is a great diversity in setting and disclosing KPIs or SPTs. And loans and bonds show a significant difference in setting verifiable KPIs and disclosing information. I find evidence that KPIs of sustainability-linked bonds are more rigid than sustainability-linked loan covenants. Also, firms using loans tend to set KPIs which are less verifiable and disclose them less. It can be explained by the fact that they do not need to struggle to borrow money due to their prior relationship with banks. However, in the bond market, firms try to show their commitment more since they lack relationships with bondholders. Such differences in relationships also affect the form of the contract, whether the coupons are tied to the step-up or step-down mechanisms.

KPI information of sustainability-linked loans are from ‘purpose remark’, ‘deal remark’, and ‘tranche remark’ in DealScan database. I use ‘DES Notes’ from Bloomberg for sustainability-linked bonds. I also gather information from Internet news and reports published by borrowing firms or banks.

First, I break down the disclosure level into 4 steps and create dummy variables respectively. When there is an ESG-related feature in the facility, I put it as *ESG-related remark*. If I could identify that there exists certain KPIs or SPTs, it is marked as *ESG-linked mentioned*. When KPIs or SPTs are disclosed in detail, I call it *KPI disclosed* and consider it a good disclosure. If such KPIs have information about the target amount, ratio, or score, I mark it as *KPI quantitative*.

Among 1,707 sustainability-linked loans, 58% are of good disclosure quality, while 96% are among 242 sustainability-linked bonds. Sustainability-linked bonds disclose their KPIs in detail constantly over the years. However, the disclosure quality deteriorated in the

Table 3: Summary statistics of key performance indicators(KPIs)

This table summarizes the characteristics of key performance indicators (KPIs) in sustainability-linked loan and bonds, respectively. The contractual terms of loans are from purpose remark, deal remark, and tranche remark in DealScan database and those of bonds are from DES notes in Bloomberg. They are also supplemented with a manual search of media releases and reports published by borrowing firms or banks. I break down the disclosure level into 4 steps. *ESG-related remark* represents a dummy variable whose value is 1 when there is an ESG-related feature in the facility. If the existence of KPIs is identified, it is marked as *ESG-linked mentioned*. *KPI Disclosure Intensity* is a dummy variable that measures how KPIs are disclosed in detail. And I consider KPIs are in good disclosure if *KPI Disclosure Intensity* is 1. If such KPIs have information about the target amount, ratio, or score, I mark it as *KPI quantitative*. KPI information on each category (environmental, social and governance) are also reported. I also present the content of contracts and incentive or penalty to borrowing rates.

	<i>Panel A : Sustainability-linked loan</i>						<i>Panel B : Sustainability-linked bond</i>				
year	2017	2018	2019	2020	2021	Total	2018	2019	2020	2021	Total
# issue	5	66	250	372	1014	1,707	1	4	19	218	242
Amount issued(\$ billion)	2.6	50.0	143.1	177.2	536.8	909.7	0.2	4.3	9.2	87.5	101.2
Raw numbers											
<i>Disclosure level</i>											
ESG-related remark	4	42	200	308	901	1,455	1	4	19	218	242
ESG-linked mentioned	4	32	172	230	697	1,135	1	4	19	218	242
KPI Disclosure Intensity	3	32	159	200	598	992	1	4	18	210	233
KPI quantitative	0	4	20	35	133	192	0	4	15	146	165
KPI disclosed_E	3	32	149	186	577	947	0	4	17	205	226
KPI disclosed_S	3	19	99	126	379	626	1	0	5	37	43
KPI disclosed_G	3	17	60	65	131	276	0	0	2	13	15
<i>Content of contracts</i>											
Reducing negative effect	0	15	73	101	367	556	0	1	8	151	160
Encouraging positive policy	0	18	55	83	353	509	1	3	11	95	110
Complying with international agreement	0	4	14	18	43	79	0	0	0	0	0
Relevance of third-party rating	3	15	72	63	182	335	0	0	2	18	20
Incentive to borrowing rate	0	18	99	111	367	595	1	0	3	15	19
Penalty to borrowing rate	0	5	53	52	191	301	1	4	17	199	221
Ratio to total number of issuance(%)											
<i>Disclosure level</i>											
KPI Disclosure Intensity	60%	48%	64%	54%	59%	58%	100%	100%	95%	96%	96%
KPI quantitative	0%	6%	8%	9%	13%	11%	0%	100%	79%	67%	68%
KPI disclosed_E	60%	48%	60%	50%	57%	55%	0%	100%	89%	94%	93%
KPI disclosed_S	60%	29%	40%	34%	37%	37%	100%	0%	26%	17%	18%
KPI disclosed_G	60%	26%	24%	17%	13%	16%	0%	0%	11%	6%	6%
<i>Content of contracts</i>											
Reducing negative effect	0%	23%	29%	27%	36%	33%	0%	25%	42%	69%	66%
Encouraging positive policy	0%	27%	22%	22%	35%	30%	100%	75%	58%	44%	45%
Complying with international agreement	0%	6%	6%	5%	4%	5%	0%	0%	0%	0%	0%
Relevance of third-party rating	60%	23%	29%	17%	18%	20%	0%	0%	11%	8%	8%
Incentive to borrowing rate	0%	27%	40%	30%	36%	35%	100%	0%	16%	7%	8%
Penalty to borrowing rate	0%	8%	21%	14%	19%	18%	100%	100%	89%	91%	91%

sustainability-linked loan market from the year 2020, when the issuance began to explode.

This implies a potential green-washing problem since banks might have made loans easier

with the popularity of sustainability-linked loans. Moreover, quantitative KPIs also suggest that sustainability-linked bonds try to show their commitment in a more verifiable way to investors. Only 192 among 1,707 loans report KPIs in a measurable way, while 165 among 242 bonds do. In appendix A.2, the disclosure level of KPIs by region is available. The sustainability-linked bond market does not vary greatly in terms of disclosure. However, North America is the poorest in reporting the KPIs of sustainability-linked loans. Only 48% of them reveal their KPIs in detail, which is far less than the total average. In sum, I find evidence that the sustainability-linked bond market is more transparent than the sustainability-linked loan market.

Second, I analyze the content of KPIs and classify them following the category of International Swaps and Derivatives Association (ISDA). ISDA categorizes KPIs into four types. The most popular contractual term is to reduce negative effects such as CO2 emissions. Encouraging positive policy is also widely used, including increasing the use of renewable energy or the ratio of women among the board of directors. The third type is to comply with international agreements. The last one is to simply tie interest rates to the rating of third-party such as MSCI, Sustainalytics, and EcoVadis. The third-party rating is considered the most objective since it is evaluated by specialized outside agents. While there is concern that the score diverges depending on the rating agency (see Berg et al., 2019), it is still the most verifiable to investors. About 20% of sustainability-linked loans use third-party ratings as their KPIs, while only 8% of sustainability-linked bonds use them. I will discuss this in section 4 in relation to the monitoring role of banks.

Table 3 also presents whether the KPIs are linked to environmental, social, or governance-related items. Both sustainability-linked loans and sustainability-linked bonds mainly focus on environmental terms. However, sustainability-linked loans are relatively more uniformly distributed in three areas due to the use of ESG ratings as their KPIs. In short, looking over the content of KPIs also suggests that sustainability-linked bonds set more verifiable targets.

Lastly, loans and bonds differ greatly in using incentive or penalty contracts. 91% of sustainability-linked bonds pay higher interest rates when their KPIs are not met, and only 8% of them enjoy lower interest rates when they meet the target. However, only 18% of loans use penalty contracts, while 35% of them get rewards when the target is met. Bond investors, who lack relationships with firms, are not generally willing to accept a lower interest rate. On the other hand, banks with prior lending relationships can easily monitor the firms. Thus, they are willing to use the step-down mechanism.

In the following sections, this paper will investigate where the contractual differences between loans and bonds stem from. I suggest that the contracts differ due to the variance of the relationship between borrowers and lenders. This study is the first to thoroughly compare contract features of sustainability-linked loans and bonds, and their borrowers and lenders.

2.2 Difference in Contractual Features

I begin by comparing the contractual terms between sustainability-linked loans and sustainability-linked bonds. First, I examine the difference in disclosure quality with the full sample. Next, using the sub-sample whose KPIs are disclosed in detail, I explore how bond covenants on KPIs are set in a more rigid fashion than loan covenants.

In Panel A of table 4, the comparison between sustainability-linked loans and sustainability-linked bonds with the full sample is reported. The average amount of loans is 0.54 billion dollars, which is significantly higher than that of bonds, 0.42 billion dollars. The average maturity of loans is 55.2 months, while bonds generally mature in 89.4 months. This result is consistent with the properties of general loans and bonds. The notable difference is that the disclosure quality of bonds is significantly better. While only 58% of sustainability-linked loans report their targets in detail, nearly all sustainability-linked bonds, 96% of them disclose their KPIs. Moreover, bonds have a higher KPI Covenant Rigidity, where KPI Covenant Rigidity is measured by the average value of penalty to borrowing rate, (1-incentive

Table 4: Univariate test for contractual features between Sustainability-linked loans and bonds

This table presents univariate comparisons of sustainability-linked loans and sustainability-linked bonds. In Panel A, unconditional comparisons are reported. The sample consists 1,707 sustainability-linked loans, where 923 firms and 370 banks participated. There are 242 sustainability-linked bonds and 179 firms are involved. Issuance amounts in billion dollars, maturity in months and contractual features are compared. *ESG-related remark* represents a dummy variable whose value is 1 when there is an ESG-related feature in the facility. *KPI Disclosure Intensity* is a dummy variable that measures how KPIs are disclosed in detail. *KPI Covenant Rigidity* is measured by the average value of penalty to borrowing rate, (1-incentive to borrowing rate), the relevance of third-party rating, and the use of environmental KPIs. In panel B, a sub-sample analysis with good disclosure is conducted. If *KPI Disclosure Intensity* is 1, I regard it as good disclosure. Additional contractual features are compared. If KPIs have information about the target amount, ratio, or score, I mark it as *KPI quantitative*. KPI information on each category (environmental, social and governance) and content of contracts and incentive or penalty to borrowing rates are also reported.

	Sustainability -linked loans (1)	Sustainability -linked bonds (2)	Mean Difference (3)	T-value (4)
<i>Panel A: Full sample</i>				
# issue	1,707	246		
# firm	923	179		
# bank	370			
Amount issued(\$ billion)	0.54	0.42	0.12	-3.84
Maturity(months)	55.2	89.4	-34.2	13.32
ESG-related remark	0.85	1.00	-0.15	17.19
KPI Disclosure Intensity	0.58	0.96	-0.38	22.58
KPI Covenant Rigidity	0.39	0.71	-0.32	30.65
<i>Panel B: Good Disclosure only</i>				
# issue	992	237		
Amount issued(\$ billion)	0.56	0.42	0.14	-3.54
Maturity(months)	54.1	89.9	-35.8	13.37
KPI quantitative	0.19	0.71	-0.52	16.08
KPI disclosed_E	0.95	0.97	-0.02	1.23
KPI disclosed_S	0.63	0.19	0.45	-15.05
KPI disclosed_G	0.28	0.06	0.21	-10.09
Reducing negative effect	0.56	0.69	-0.13	3.59
Encouraging positive policy	0.51	0.47	0.04	-1.12
Complying with international agreement	0.08	0.00	0.08	-9.26
Relevance of third-party rating	0.34	0.08	0.25	-10.77
KPI Covenant Rigidity	0.52	0.73	-0.32	21.41
Incentive to borrowing rate	0.49	0.07	0.42	-18.09
Penalty to borrowing rate	0.26	0.92	-0.66	29.13

to borrowing rate), the relevance of third-party rating, and the use of environmental KPIs.

Panel B confirms that sustainability-linked bonds set more rigid targets and use penalty mechanisms to show their commitment to ESG activities. 71% among good disclosure bonds report their targets in quantitative measures, however, only 19% of loans do. And KPIs are much more rigid to bond borrowers. sustainability-linked bonds receive penalties when they do not meet the target, on the other hand, sustainability-linked loans make more reward-oriented contracts.

3 The Choice between Sustainability-linked Loans and Bonds

In this section, I confirm that bond covenants on the key performance indicators (KPIs) of the borrowers' ESG activities are disclosed in a more granular and rigid fashion than loan covenants. And the size of a firm as a proxy for the borrower's relative bargaining power against the bank is also related to the firm's preference of sustainability-linked bonds over sustainability-linked loans.

Table 5 reports the multivariate regression estimates for the difference in contractual features between sustainability-linked loans and bonds. I test whether the sustainability-linked loans and bonds differ in the disclosure intensity and rigidity level of their KPIs. I first report the logit regression estimates testing whether the use of sustainability-linked loans implies less disclosure. In Panel A, the full sample analysis shows that loans reveal their KPIs less after being controlled with issuance amounts, whether they are listed or not, and the size of borrowers. In panel B, I show the sub-sample analysis with firms with mixed use of sustainability-linked loans and bonds. The coefficients are less but still significant before being controlled with the country-fixed effect.

Table 5: Multivariate test for contractual features between Sustainability-linked loans and bonds

This table reports regression estimates for the relationship between contractual features and indicators for sustainability-linked loans. In A, logit regression estimates are reported, where the dependent variable is a dummy variable for *KPI Disclosure Intensity*. In B, OLS regression estimates are reported where the dependent variable measures how rigid the KPIs are to the borrowers, constructed as the average value of penalty to borrowing rate, (1-incentive to borrowing rate), the relevance of third-party rating, and the use of environmental KPIs. The regression in panel A is conducted with a full sample, while in panel B, I use sub-sample with borrowing firms using both sustainability-linked loans and bonds. Standard errors are clustered in the country level and t-values are presented in parentheses below the corresponding coefficients with statistical significance denotes as follows: *p<0.10, ** p<0.05, *** p<0.01.

<i>A. KPI Disclosure Intensity</i>						
	Panel A: Full sample			Panel B: Subsample		
	(1)	(2)	(3)	(4)	(5)	(6)
Loan indicator	-2.986*** (-6.05)	-3.290*** (-5.30)	-3.494*** (-4.49)	-2.496** (-2.56)	-2.064 (-1.56)	-1.966 (-1.60)
ln(amt_issued_bil)	-0.014 (-0.23)	0.007 (0.10)	-0.089 (-1.53)	0.348** (1.97)	0.341 (0.75)	0.287 (0.65)
Listed	0.858*** (5.53)	1.022*** (6.36)	0.897*** (4.11)	-0.416 (-0.51)	-0.045 (-0.04)	-1.038 (-1.01)
ln(total_asset)			0.137** (2.03)			0.128 (0.22)
Fixed effect	no	country	country	no	country	country
N	1,922	1,863	1,345	133	71	66
<i>B. KPI Covenant Rigidity</i>						
	Panel A: Full sample			Panel B: Subsample		
	(1)	(2)	(3)	(4)	(5)	(6)
Loan indicator	-0.328*** (-18.41)	-0.328*** (-17.19)	-0.303*** (-15.13)	-0.256*** (-6.66)	-0.251*** (-6.53)	-0.244*** (-5.77)
ln(amt_issued_bil)	0.009 (1.29)	0.005 (0.75)	-0.009 (-1.26)	0.051** (2.26)	0.051** (2.27)	0.057** (2.39)
Listed		0.061*** (3.31)	0.027 (1.13)		-0.042 (-0.90)	-0.058 (-0.99)
ln(total_asset)			0.020*** (4.04)			-0.012 (-0.91)
Constant	0.737*** (35.25)	0.701*** (27.36)	0.513*** (10.12)	0.736*** (37.98)	0.766*** (18.42)	0.888*** (5.85)
Fixed effect	country	country	country	country	country	country
N	1,922	1,922	1,405	133	133	124
Adj. R-sq	0.304	0.320	0.312	0.737	0.737	0.741

Next, OLS regression estimates testing whether the use of sustainability-linked loans is related to less rigid KPIs are reported. Panel A and B strongly show that sustainability-linked loans indicate that they are using less rigid KPIs compared to sustainability-linked bonds. The KPI Covenant Rigidity is about 30 percentage points lower with the use of sustainability-linked loans in the full sample.

3.1 Borrower Characteristics

To explain the determinants of a firm’s preference between sustainability-linked loans and bonds, I discuss the borrower characteristics in this section. Table 6 compares the borrower characteristics of sustainability-linked loans and sustainability-linked bonds. Columns (1) and (2) show that borrowers of bonds are slightly bigger than borrowers of loans in terms of total assets. However, they do not differ significantly in their size and revenues. Moreover, about 48% of borrowing firms are listed in both samples.

If I break down the borrowers into three levels, the results are quite different. I divide them into borrowers using sustainability-linked loans only, borrowers with mixed usage of sustainability-linked loans and bonds, and borrowers using sustainability-linked bonds only. Columns (3) to (6) present that firms using loans only have 17 billion dollars on average and companies using bonds only have 15 billion dollars on average. However, firms using both loans and bonds have more than 30 billion dollars. Thus, firms with mixed usage are generally large and publicly listed and these descriptive statistics suggest that firm size is related to access to the mix of sustainability-linked loan and bond markets.

Table 6 also presents the relationship ratio between banks and borrowers. Relationship ratio is the average value of conventional relationship ratio and ESG relationship ratio, where conventional relationship ratio is the number of lenders with prior lending relationship divided by the total number of lenders and ESG relationship ratio is the number of lenders with prior sustainability-linked lending relationship divided by the total number of lenders. I measure the conventional relationship and ESG relationship separately with the conjecture

Table 6: Borrower characteristics

This table presents the characteristics of borrowers in the sustainability-linked debt market. In Panel A, summary statistics of the full sample are reported and panel B reports those of the sub-sample with good disclosure. Loan and bond features are number of issuance, issuance amount in billion dollars, and maturity in months. I also report the borrower's total assets and revenues in million dollars, whether it is listed or not, and the relationship ratio with lenders. *Relationship* is the average value of *Conventional Relationship* and *ESG Relationship*. *Conventional Relationship* is the number of lenders with prior lending relationships divided by the total number of lenders and *ESG Relationship* is the number of lenders with prior sustainability-linked lending relationships divided by the total number of lenders. Additional contractual features are also reported. Columns (1) and (2) are unconditional sustainability-linked loans and bonds, respectively. Column (3) consists of the sample using sustainability-linked loans only. Columns (4) and (5) are sustainability-linked loans and bonds if borrowing firms use both sustainability-linked loans and bonds. And column (6) consists of the sample using sustainability-linked bonds only.

	Sustainability -linked loans (1)	Sustainability -linked bonds (2)	SLLs -only (3)	SLLs among mixed used (4)	SLBs among mixed used (5)	SLBs -only (6)
<i>Panel A: Full sample</i>						
# issue	1707	242	1636	71	62	180
Amount issued(\$billion)	0.54	0.41	0.52	0.99	0.61	0.34
Maturity(months)	55.2	88.9	55.6	47.0	105.4	83.1
Total assets(\$million)	18,138	21,146	17,029	37,669	31,856	15,435
Revenue(\$million)	9,192	10,463	8,327	22,861	16,401	8,192
Listed	0.48	0.48	0.46	0.92	0.61	0.43
Relationship ratio	0.34		0.34	0.54		
Conventional Relationship ratio	0.43		0.42	0.69		
ESG Relationship ratio	0.26		0.26	0.39		
ESG-related remark	0.85	1.00	0.85	0.92	1.00	1.00
KPI Disclosure Intensity	0.58	0.96	0.58	0.69	0.97	0.96
KPI Covenant Rigidity	0.39	0.71	0.39	0.41	0.73	0.71
<i>Panel B. Good Disclosure only</i>						
# issue	992	233	943	49	60	173
Amount issued(\$billion)	0.56	0.41	0.53	1.21	0.63	0.34
Maturity(months)	54.1	89.3	54.3	50.0	106.9	83.1
Total assets(\$million)	19,368	20,818	17,782	44,801	32,221	14,840
Revenue(\$million)	9,549	9,937	8,429	25,579	15,613	7,836
Listed	0.57	0.48	0.55	0.92	0.60	0.44
Relationship ratio	0.35		0.34	0.58		
Conventional Relationship ratio	0.43		0.42	0.70		
ESG Relationship ratio	0.27		0.26	0.47		
Relevance of third-party rating	0.34	0.09	0.34	0.24	0.07	0.09
KPI Covenant Rigidity	0.52	0.73	0.52	0.48	0.75	0.72
Incentive to borrowing rate	0.49	0.07	0.49	0.47	0.05	0.08
Penalty to borrowing rate	0.26	0.92	0.26	0.29	0.98	0.90

that monitoring financial information and ESG information would be different. Firms with mixed usage of sustainability-linked loans and bonds have more prior lending relationships

with banks both in conventional and ESG perspectives. Thus, they are larger firms with a more mature lending history. Panel B shows contractual terms with the good disclosure sample. The results suggest that the contractual features do not differ significantly among sustainability-linked loans and bonds, respectively.

3.2 Determinants of the Mix of Sustainability-linked Loans and Bonds

In the previous section, I discuss that borrowing firms face a decision between the control of banks and strict bond covenants in the sustainability-linked debt market. In this section, I show that the size of a firm as a proxy for the borrower’s relative bargaining power against the bank determines the firm’s access to the sustainability-linked loan and bond markets.

Table 7 reports multinomial regression estimates for the relationship between firm size and preference for sustainability-linked loans and bonds. I compare the firm size measured by total assets in logarithm, whether the firm is listed or not, and the market-to-book ratio in logarithm, while controlling the issuance amount. Columns (1) to (3) compare firms using sustainability-linked loans only and bonds only. The regression coefficients show that there is no significant difference between the two groups. This can be explained by the empirical facts from Kim et al.(2022) that firms using sustainability-linked loans are larger compared to firms with other bank loans.

Next, columns (4) to (6) compare firms using sustainability-linked loans only and using both loans and bonds. And Columns (7) to (9) compare firms using sustainability-linked bonds only and using both loans and bonds. The table shows that firms with mixed usage of loans and bonds are greater in their size compared to firms using either loans or bonds. Thus, while firms in the sustainability-linked debt markets are bigger in their size compared to the firms outside the market, firms with greater size have accessibility to both markets. Meanwhile, when the ratio of market to book is further added, the size loses its significance. And the coefficient of market-to-book is negative in column (9), which contradicts the result

Table 7: Borrower size and preference between sustainability-linked loan and bond

This table reports multinomial regression estimates for the relationship between firm size and preference of sustainability-linked loans and bonds. Columns 1-3 compare firms using sustainability-linked loans only and bonds only. Columns 4-6 compare firms using sustainability-linked loans only and using both loans and bonds. Columns 7-9 compare firms using sustainability-linked bonds only and using both loans and bonds. Size is measured by the total assets in logarithms. *Market to book* is market capitalization divided by the book value. $\ln(\text{amt_issued_bil})$ is issuance amount in logarithm. T-values are presented in parentheses below the corresponding coefficients with statistical significance denotes as follows: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Loan only(=1) vs. Bond(=2)			Loan only(=1) vs. Mixed use(=3)			Bond only(=2) vs. Mixed use(=3)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\ln(\text{total_asset})$	0.081 (0.63)	0.102 (0.58)	0.052 (0.32)	0.520*** (3.13)	0.479*** (3.12)	0.289 (1.39)	0.672** (2.42)	0.523* (1.83)	0.363 (1.40)
Listed	0.195 (0.43)	0.165 (0.37)		0.291 (0.36)	0.306 (0.39)		0.458 (0.82)	0.681 (1.33)	
Market to book			0.056 (1.51)			0.001 (0.06)			-0.108*** (-3.31)
$\ln(\text{amt_issued_bil})$		-0.076 (-0.46)	-0.275 (-1.46)		0.075 (0.51)	0.060 (0.31)		0.476 (1.59)	0.486 (1.32)
Constant	-3.255*** (-3.51)	-3.527** (-2.28)	-3.482* (-1.86)	-7.214*** (-6.05)	-6.752*** (-5.96)	-4.764** (-2.47)	-6.412*** (-2.74)	-4.615* (-1.75)	-2.096 (-0.89)
N	1,424	1,405	662	1,424	1,405	662	227	227	116

of Houston and James (1996) that high market-to-book ratio firms (i.e. growth firms) prefer using bank loans when there are multiple lenders. Thus, it can be inferred that growth firms can access sustainability-linked bonds more easily.

4 Banking Relationship and KPI Covenant Intensity

In this section, I explore sustainability-linked loan covenant intensity with the degree of the banking relationship. Repeated lending relationships reduce covenant intensity as information asymmetry is solved between lenders and borrowers, but then it increases as the borrowers' concerns arise regarding the lenders' monopolistic rent extraction. In addition to the motivation to spill the information to the public to borrow money from arm's length creditors, they also have a voluntary motive to show their commitment to ESG activities. I empirically find that such a U-shaped relationship is significant only for large borrowers and those large borrowers tend to write intense covenants, such as third-party ESG ratings,

which implies that they are more concerned with signaling their ESG commitment.

4.1 Lending Relationship and KPI Covenant Intensity

Table 8 reports OLS regression results for the relation between KPI Disclosure Intensity and the lending relationship between borrowers and lenders. I measure the relationship ratio by the average value of the conventional relationship and ESG relationship. Conventionally, banks monitor borrowers' financial information, while ESG information is monitored when using sustainability-linked loans. Thus, I measure those relationships separately and use the average value. The conventional relationship variable is constructed by dividing the number of lenders with prior lending relationships with the total number of lenders. And ESG relationship is the number of lenders with prior sustainability-linked lending relationships divided by the total number of lenders.

Columns (1) and (2) show that sustainability-linked loan disclosure intensity is U-shaped in the degree of the banking relationship. Such relation is significant when measured with ESG banking relationships, suggesting that the ESG relationship is the key source of driving this result. As the lender becomes informed about the borrower, covenant intensity is reduced as information asymmetry is solved between two parties. But it then increases as borrowers are concerned about the lenders' monopolistic rent extraction. Thus, they choose strategic behaviors by revealing their information in order to leave the sustainability-linked loan market and borrow from the public. Columns (3) and (4) show that only borrowers whose sizes are greater than the median value have a significant U-shaped relation between lending relationship and KPI disclosure intensity. And when the borrower is listed, the disclosure intensity increases, while other contractual control variables do not have significance. Columns (5) to (8) test whether banking relationship influences the KPI covenant rigidity and the results are not significant.

Table 8: Lending relationship and KPI Disclosure Intensity and KPI Covenant Rigidity

OLS regression estimates are reported for the relation between *KPI Disclosure Intensity* (columns 1-4) and the relationship ratio between borrowers and lenders, and loan and firm characteristics. In columns 5-8, I run the OLS regression where the dependent variable measures *KPI Covenant Rigidity*, constructed as the average value of penalty to borrowing rate, (1-incentive to borrowing rate), the relevance of third-party rating, and the use of environmental KPIs. Sub-sample analyses are also reported by sorting borrower size into two groups. *Relationship* is the average value of *Conventional Relationship* and *ESG Relationship*. *Conventional Relationship* is the number of lenders with prior lending relationships divided by the total number of lenders and *ESG Relationship* is the number of lenders with prior sustainability-linked lending relationships divided by the total number of lenders. Standard errors are clustered in the country level and t-values are presented in parentheses below the corresponding coefficients with statistical significance denotes as follows: *p<0.10, ** p<0.05, *** p<0.01.

	<i>KPI Disclosure Intensity</i>				<i>KPI Covenant Rigidity</i>			
	Full (1)	Full (2)	Big (3)	Small (4)	Full (5)	Full (6)	Big (7)	Small (8)
Relationship	-0.283 (-1.61)				0.026 (0.32)			
Relationship ²	0.262 (1.64)				-0.011 (-0.14)			
ESG Relationship		-0.967*** (-3.47)	-1.011** (-2.29)	-1.032 (-1.49)		0.051 (0.37)	-0.031 (-0.26)	0.132 (0.38)
ESG Relationship ²		0.962*** (3.33)	0.984** (2.17)	0.988 (1.39)		-0.037 (-0.28)	0.039 (0.32)	-0.095 (-0.28)
ln(amt_issued_bil)	0.002 (0.10)	0.003 (0.16)	-0.020 (-0.93)	-0.024 (-0.95)	0.014* (1.82)	0.014* (1.82)	0.006 (0.31)	-0.003 (-0.26)
Listed	0.238*** (6.75)	0.231*** (7.23)	0.135 (1.63)	0.250*** (4.02)	0.015 (0.83)	0.017 (0.84)	-0.033 (-0.76)	-0.008 (-0.29)
Number of lenders	-0.000 (-0.11)	-0.000 (-0.08)	0.002 (0.30)	0.010 (0.83)	-0.002 (-0.96)	-0.002 (-0.90)	-0.003 (-1.04)	-0.002 (-0.48)
ln(maturity)	-0.031 (-0.74)	-0.032 (-0.78)	0.036 (0.80)	-0.054 (-0.85)	-0.011 (-0.78)	-0.011 (-0.73)	-0.026 (-1.35)	-0.005 (-0.18)
constant	0.612*** (3.66)	0.609*** (3.80)	0.405** (2.09)	0.607** (2.03)	0.579*** (9.26)	0.578*** (9.10)	0.678*** (6.85)	0.535*** (4.07)
Fixed effect	country	country	country	country	country	country	country	country
N	1682	1682	639	607	983	983	421	355
Adj. R-sq	0.119	0.122	0.083	0.189	0.213	0.212	0.235	0.260

4.2 Borrower Size and KPI Covenant Rigidity

Table 9 shows the OLS and logit regression estimates to test whether the borrower size is related to KPI covenant rigidity. Column (1) suggests that a one percent increase in total assets in billion dollars implies the use of 0.022 percentage points more rigid covenants. By decomposing the KPI covenant rigidity, the use of third-party ratings in columns (2)

Table 9: Borrower size and KPI covenant rigidity

This table reports OLS(Columns 1-4) and Logit(Columns 5-7) regression estimates for the relation between borrower size and KPI covenant rigidity. *KPI Covenant Rigidity* is measured by the average value of penalty to borrowing rate, (1-incentive to borrowing rate), the relevance of third-party rating, and the use of environmental KPIs. Regression estimates on each variable used to construct KPI covenant rigidity are also reported. Standard errors are clustered in the country level for OLS regressions and t-values are presented in parentheses below the corresponding coefficients with statistical significance denotes as follows: *p<0.10, ** p<0.05, *** p<0.01.

	<i>OLS</i>				<i>Logit</i>		
	KPI Rigidity	Third-party Rating	KPI Env.	Penalty	Third-party Rating	KPI Env.	Penalty
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ln(total_asset)	0.022*** (4.22)	0.026** (2.02)	0.031* (1.95)	0.002 (0.12)	0.235** (2.49)	0.060 (0.83)	-0.023 (-0.26)
ln(amt_issued_bil)	-0.011 (-1.40)	-0.035* (-2.00)	-0.010 (-0.62)	0.009 (0.54)	-0.415*** (-3.74)	-0.078 (-0.78)	0.129 (1.05)
Listed	0.030 (1.22)	0.141** (2.23)	0.159*** (3.27)	-0.007 (-0.23)	1.001** (2.37)	0.616*** (3.09)	0.062 (0.30)
Number of lenders	-0.000 (-0.22)	-0.002 (-0.56)	0.001 (0.10)	0.004 (1.36)	0.014 (0.68)	0.022 (0.87)	0.021 (1.12)
ln(maturity)	-0.003 (-0.15)	-0.003 (-0.11)	-0.000 (-0.01)	0.040 (1.06)	0.457 (1.56)	0.073 (0.31)	0.574* (1.71)
constant	0.208* (1.95)	-0.111 (-0.79)	0.227 (1.19)	0.012 (0.05)	-6.515*** (-5.14)	-0.986 (-0.96)	-3.513** (-1.98)
Fixed effect	country	country	country	country	no	no	no
N	1246	1246	1246	1246	1246	1246	1246
Adj. R-sq	0.159	0.173	0.127	0.097			

and (5) is significant. KPIs related to the environment show a slightly significant positive relationship with the borrower size when using the OLS method in (3), however, it loses significance in column (6) with logit regression. The penalty to borrowing rates in columns (4) and (7) is insignificantly related to the borrower size. In sum, borrower size is positively related to the KPI covenant rigidity, suggesting that bigger firms have a strong motivation to signal their commitment to ESG activities.

5 Conclusion

Traditionally, a firm’s decision between bank loan and public debt depends on the trade-off between enduring bank’s monopoly rent and inefficient bond covenants. This paper addresses whether such a trade-off is existent in the novel sustainability-linked debt markets where lenders and bondholders face borrowers’ ESG profile uncertainty. These markets are of great importance in their growth and investors’ interests around the globe.

Using the novel sustainability-linked bonds and loans sample from 2017 to 2021, I confirm that bond covenants on the key performance indicators (KPIs) of the borrowers’ ESG activities have higher disclosure intensity and more rigidity compared to loan covenants. While 96% of sustainability-linked bonds disclose their KPIs in detail, only 58% of sustainability-linked loans do. Moreover, covenants on sustainability-linked bonds generally use penalty-driven contracts and write terms on the environment.

I examine whether the size of a firm is related to the firm’s preference of sustainability-linked bonds over sustainability-linked loans. Conventionally, small and opaque firms are likely to stay with the informed relationship banks despite the banks’ rent extraction threat. On the other hand, firms of greater size could borrow from the less informed public creditors. I find that the size of a firm as a proxy for the borrower’s relative bargaining power against the bank is also relevant to the firm’s accessibility to the mixed usage of sustainability-linked loans and bonds. Since the sustainability-linked debt market has emerged recently, most firms use one of them and only a small number of firms use both. Thus, this paper explores the relationship between firm size and the choice between sustainability-linked loans and bonds by dividing borrowers into groups. To complete the work, further analysis is needed by using the ratio of sustainability-linked loans to the sum of sustainability-linked loans and bonds, following Houston and James (1996).

I also discuss covenant intensity and lending relationship in the sustainability-linked loan market. I find that sustainability-linked loan covenant intensity is U-shaped in the degree of the banking relationship, where such relation is significant only with the prior

sustainability-linked lending relationship. With the repeated lending relationship, covenant intensity reduces but then increases as the borrowers' concerns arise regarding the lenders' monopolistic rent extraction. Additionally, I empirically find that large borrowers are more concerned with signaling their ESG commitment and are likely to write intense covenants such as third-party ESG ratings.

Overall, I confirm that traditional banking theory is extended in the sustainability-linked debt market. My study complements recent work on sustainability-linked debts by providing the first comprehensive contractual features of sustainability-linked loans and bonds and how they are consistent with traditional banking theory. Further discussions by comparing sustainability-linked debts with conventional debts or green debts will enrich the analysis.

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국문 초록

지속가능성연계부채 시장에서의 기업의 자본 조달 선택

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전통적으로 기업은 은행의 지대착취(rent extraction) 문제와 채권 계약의 비효율성을 고려하여 자본 조달 방식을 결정한다. 본 논문에서는 지속가능성연계부채 시장에서도 이러한 상충관계가 존재하는지 검증했다. 2017년부터 2021년까지 지속가능성연계채권과 지속가능성대출 표본을 이용하여, 기업의 채권 약정이 대출 약정보다 더 세분화되어 공개되며 엄격한 방식으로 작성됨을 확인했다. 기존 문헌과 마찬가지로 기업 규모 역시 지속가능성연계대출보다 지속가능성연계채권을 선호하는 것에 영향을 미치는 것으로 나타났다.

주요어 : 지속가능성연계대출, 지속가능성연계채권, 환경·사회·기업 지배구조, 약정, 은행 관계

학번 : 2021-29487