Beyond Green Claims: The Market Value of Credibility in Sustainability-Linked Bonds

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Abstract

Sustainability-linked bonds (SLBs) link issuers' financing costs to progress on predefined sustainability performance targets, but SLB contracts differ sharply in the strength of the mechanisms that enforce these commitments. We examine whether credit markets price these contractual features. Since enforcement provisions are not coded in structured datasets and appear only within the text of SLB frameworks and legal contracts, we recover information on penalty clauses, external assurance requirements, and reporting obligations from the contractual documentation and its subsequent updates. Merging these measures with a monthly panel of secondary-market data covering 850 SLBs issued between 2019 and 2025, we find that contractual enforceability is a priced characteristic: a one-standard-deviation increase reduces Z-spreads by roughly 70–75 basis points in a specification with bond and year-month fixed effects. Descriptive specificity of performance targets has no incremental pricing effect once enforcement strength is controlled for. Price adjustments occur immediately following disclosure events, and the effect is stronger when issuers are off-track in meeting their targets and weaker when performance is externally assured. These findings show that investors distinguish between enforceable and non-enforceable sustainability commitments and highlight the importance of contract design for the functioning of the SLB market.

Keywords: Sustainability-Linked Bonds; Contract Design; Enforcement Mechanisms; Credit Spreads; Sustainable Finance; Corporate Bonds

1. Introduction

Sustainability-linked bonds (SLBs) embed environmental commitments directly into the debt contract: coupon payments adjust depending on whether the issuer meets predefined sustainability performance targets (SPTs). By tying the cost of capital to future sustainability outcomes, SLBs aim to strengthen corporate incentives and ensure that environmental commitments are both credible and economically meaningful. This contractual architecture differs from traditional green bonds, whose credibility relies on the use of proceeds rather than on enforceable performance incentives.

A central question, however, is whether SLBs achieve this objective in practice. Market participants, regulators, and recent policy reports highlight substantial heterogeneity in the contractual strength of SPTs across issuers. Some SLBs contain well-defined targets supported by external assurance, regular reporting obligations, and binding penalty mechanisms; others rely on broad narratives or targets that are difficult to verify or enforce. This variation has raised concerns that SLBs may enable symbolic or non-credible climate commitments unless enforcement mechanisms are sufficiently strong [e.g., Ehlers et al., 2022, European Central Bank, 2024]. Yet little is known about whether credit markets identify and price this contractual heterogeneity.

Prior research shows that environmental attributes influence bond pricing [Tang and Zhang, 2020, Flammer, 2021, Bolton and Kacperczyk, 2021], but this literature typically treats sustainability features as fixed, externally verified labels rather than as contractual obligations that vary across issuers and evolve over time. At the same time, the growing literature on sustainable finance emphasizes credibility as the key friction that limits the effectiveness of voluntary climate commitments. Whether markets can distinguish between enforceable and non-enforceable sustainability obligations within SLB contracts remains an open empirical question.

This paper examines whether credit markets price the enforceability of sustainability commitments in SLB contracts. Because enforceability is not directly observable in structured datasets, we recover information on penalty activation, external verification, and reporting requirements from the underlying contractual documentation and subsequent disclosures. These contractual features allow us to characterize two dimensions of credibility: (i) contractual enforcement strength, capturing mechanisms that bind the issuer to its sustainability promises; and (ii) target precision, reflecting the clarity and quantifiability of SPT definitions. We merge these measures with monthly secondary-market pricing data for more than 800 SLBs issued between 2019 and 2025.

This study contributes to several strands of literature. First, it adds to research on sustainable finance by showing that investors price the credibility of sustainability commitments, and in particular the contractual mechanisms that ensure enforcement, rather than the mere presence of environmental targets [Tang and Zhang, 2020, Flammer, 2021]. Second, it contributes to the literature on bond contracting and climate-risk pricing by providing the first large-sample evidence that enforcement-related contractual provisions in SLBs have meaningful effects on credit spreads. Third, by recovering contract terms that are not observable in structured datasets, the paper offers an empirical approach to studying incentive design in sustainability-linked financing. Finally, the findings inform policy discussions on SLB standardization by showing that markets reward enforceability and accountability, while detailed but non-binding target descriptions do not generate similar valuation effects.

The remainder of the paper proceeds as follows. Section 2 reviews related research. Section 3 describes the data and the construction of contractual credibility measures. Section 4 presents the empirical design. Section 5 reports the main pricing results and heterogeneity analyses. Section 6 provides robustness and

extensions. Section 7 concludes.

2. Literature Review

Research in sustainable finance, corporate credit markets, and contracting provides the foundation for understanding how environmental and ESG-related commitments influence financing costs. Prior work shows that sustainability information, verification, and credibility affect asset prices and perceived credit risk, and that contractual design plays a central role in shaping firm incentives. These insights are directly relevant for sustainability-linked bonds (SLBs), a rapidly growing but still relatively new instrument in which performance-based sustainability commitments are embedded in the debt contract. Although the SLB market has expanded quickly, little evidence exists on whether investors price the credibility of these contractual commitments or on how credit spreads adjust when the contractual structure is strengthened or revised. Our study addresses this gap by examining whether secondary-market spreads incorporate the enforcement mechanisms that make SLB commitments credible and by documenting that these mechanisms have substantial pricing implications. This perspective links our contribution to research on sustainable debt markets, to work on contracting frictions and credit risk, and to the broader literature on the valuation of credible information in asset pricing.

2.1. Green Bonds and the Role of Credibility

Research on green bonds provides a natural starting point for understanding how sustainability characteristics influence bond valuation. Early empirical work examines whether green bonds command a "greenium," with mixed results. Zerbib [2019] document modest premia in matched bond pairs, while Baker et al. [2018] find larger premia for certified municipal issues. In contrast, Hachenberg and Schiereck [2018] report no systematic premium once issuer characteristics and liquidity are taken into account. Subsequent studies show that any greenium is sensitive to features such as certification, disclosure quality, and issue characteristics, and that pricing effects are heterogeneous across markets and issuer types [e.g., Kapraun et al., 2021].

More recent work emphasizes that credibility and verification are central to whether sustainability labels affect financing costs. Tang and Zhang [2020] show that credible green bond issuances generate positive equity-market reactions, and Flammer [2021] finds that credible issuances improve environmental performance and reduce borrowing costs. Ehlers et al. [2022] highlight that weak monitoring and verification reduce the informational content of environmental labels. Related theoretical and empirical work argues that the pricing of sustainable assets depends on both investor preferences and the credibility of the underlying information, and that noisy or unreliable signals limit the impact of sustainability characteristics on asset prices [e.g., Pástor et al., 2021].

These findings indicate that investors do not respond to sustainability labels in isolation. They respond to the credibility of the associated commitments and to the mechanisms that make these commitments verifiable. In the case of green bonds, credibility is tied to the allocation of proceeds and to external certification. In the case of sustainability-linked bonds, credibility is determined instead by the contractual structure that governs penalties, reporting, and verification. Our analysis extends this literature by showing that the enforcement mechanisms embedded in SLB contracts, rather than descriptive detail in target setting, are the components of credibility that are reflected in credit spreads.

2.2. Contracting and the Emerging Literature on SLBs

A growing literature examines the economics of sustainability-linked bonds (SLBs) as performance-contingent debt instruments. Theoretical work such as Li et al. [2022] and Berrada et al. [2022] shows that SLBs can reduce firms' cost of capital when penalties are sufficiently strong and contractible, whereas weak enforcement creates moral hazard and limits environmental impact. Empirical evidence is consistent with these predictions. Berrada et al. [2022] find that secondary-market spreads decline with penalty size, indicating that investors value stronger enforcement. Regulatory analyses, including European Central Bank [2024], report that SLBs with verifiable sustainability performance targets (SPTs) trade at lower spreads than those with vague or unenforceable commitments.

A related strand of work studies issuance dynamics and contractual heterogeneity. Kölbel and Lambillon [2023] document potential mispricing when issuance premia exceed the actuarial value of penalties. Kölbel and Lambillon [2022] show that emerging-market issuers face higher premia, reflecting higher information frictions. Dorfleitner et al. [2023] find that external assurance improves liquidity, and Mathew and Sivaprasad [2023] provide evidence that post-issuance improvements in environmental outcomes occur only when SLB contracts include enforceable provisions. Structural perspectives such as Erlandsson and Mielnik [2022] analyze optional ESG-related cash flows embedded in SLB structures. Recent work by Feldhütter et al. [2024] constructs synthetic controls for SLBs and shows that spreads are closely aligned with penalty strength and that target ambition is often limited. Complementary evidence in Feldhütter and Pedersen [2024] suggests that SLBs hedge certain dimensions of ESG-related risk and exhibit a negative ESG risk premium.

Additional research shows more general contracting and information frictions that influence the pricing of performance-contingent securities. Studies on covenant design, contract enforcement, and verification in credit markets show that investors place value on mechanisms that reduce information asymmetry and agency conflicts [e.g., Chava et al., 2010, Roberts and Sufi, 2009, Gârleanu and Panageas, 2020]. These insights map closely to the SLB setting, where the credibility of sustainability commitments depends on the strength of contractual penalties, reporting obligations, and verification requirements. Related work on ESG disclosure and assurance also supports the idea that credible verification affects spreads [e.g., Buehlmaier and Zeume, 2022, Christensen et al., 2021].

Although this literature provides important foundations, two gaps remain. First, existing empirical work does not systematically measure the enforceability of SLB contracts using the full content of the underlying documentation. Much of the contractual structure that governs SLB credibility is embedded in legal text and is not captured in standard datasets. Second, prior studies do not examine how credit markets respond when contractual provisions are updated over time through annual SPT reports or revisions to SLB frameworks. Our paper addresses both gaps by recovering contract-level enforcement strength and target precision from SLB documents and by exploiting within-bond variation to study how credit spreads adjust when these contractual features become publicly observable. This approach expands the empirical analysis beyond penalty magnitudes and enables a more comprehensive assessment of the contractual mechanisms that support issuer accountability.

2.3. Textual Information, Disclosure Credibility, and Contractual Signals

A substantial literature shows that financial markets extract economically meaningful information from narrative disclosures. Foundational work such as Loughran and McDonald [2016] demonstrates that linguistic features of financial reports predict volatility, earnings outcomes, and firm risk. Recent applications in sustainability and climate finance extend these insights by showing that textual information contains priced

signals about environmental exposure and managerial credibility. Sautner et al. [2023] use earnings-call transcripts to construct firm-level climate risk measures that predict returns and volatility. Buehlmaier and Zeume [2022] show that credible and externally assured ESG disclosures reduce bond spreads by mitigating information asymmetry. Other studies use textual approaches to quantify ESG-specific sentiment and risk exposure [e.g., Cohen et al., 2020, Li et al., 2021, Hassan et al., 2021], reinforcing the idea that markets respond to the quality and credibility of sustainability information.

This work establishes that unstructured text can convey priced information, but it focuses primarily on managerial communication, earnings calls, and sustainability reporting rather than on contractual content. In contrast, the core terms that determine the credibility of sustainability-linked bonds appear only in SLB legal documentation and are not captured in structured financial datasets. Recovering these contractual signals is therefore essential for understanding how SLBs are valued. The extraction exercise is not the contribution itself; rather, it allows us to observe the contractual mechanisms that govern enforceability and accountability, which are otherwise unobservable yet central to the pricing of performance-contingent debt.

2.4. Climate Risk, Policy Uncertainty, and Credit Markets

SLBs are priced in an environment where climate risk, policy uncertainty, and regulatory constraints affect firms' creditworthiness and investors' demand for credible sustainability commitments. Baker et al. [2023] show that increases in climate policy uncertainty widen corporate bond spreads, particularly for carbon-intensive issuers. Seltzer et al. [2022] document that firms exposed to stricter environmental regulation face higher financing costs unless they demonstrate credible ESG practices. Physical climate risk is also reflected in credit markets, as shown by evidence that extreme climate events raise corporate and municipal bond yields [Duan et al., 2023, Painter, 2020]. Transition risk is likewise priced, and carbon emissions are strongly associated with higher spreads and lower credit quality [Bolton and Kacperczyk, 2021].

Complementary work shows that markets respond to climate-related information flows. Engle et al. [2020] construct a climate news index and demonstrate that climate-related news shocks affect asset prices and systematic risk exposures. These findings show that credible, verifiable climate information plays an important role in shaping credit spreads and investor expectations. The broader implication is that in settings where sustainability outcomes are uncertain and difficult to forecast, investors place greater value on mechanisms that enhance the credibility of environmental commitments.

Taken together, these strands of research indicate that credibility, verification, and enforceability are central to the pricing of sustainability-related risks. Our study contributes to this literature by showing that the enforcement mechanisms embedded directly in SLB contracts carry significant pricing implications in secondary markets, and by demonstrating that markets differentiate between enforceable contractual obligations and non-binding sustainability narratives.

3. Data

We construct a monthly panel of sustainability-linked bonds (SLBs) by combining Refinitiv secondary-market pricing data with information on the contractual structure of each SLB. This dataset allows us to study how variation in the contractual strength of sustainability commitments is reflected in bond valuations.

3.1. SLB Universe and Sample Construction

The sample includes all SLBs issued between 2019 and 2025 for which Refinitiv provides complete monthly pricing data and for which the full contractual documentation is publicly available. The documentation set

consists of SLB frameworks, prospectuses, detailed descriptions of sustainability performance targets (SPTs), and post-issuance reporting. Each bond is tracked from the month of issuance through maturity or the end of the sample period. After merging pricing data, bond characteristics, and contractual information, the baseline regression sample contains approximately 21,000 bond–month observations, corresponding to roughly 850–900 unique SLBs depending on the activation rule applied. The sample spans a broad range of issuers across regions and sectors. Because our empirical design relies on within-bond changes in contractual features, we retain only bonds that experience at least one substantive disclosure event, typically an annual SPT report or a revision to the SLB framework.

3.2. Pricing Data

Monthly pricing data from Refinitiv include bid and ask quotes, yields, and curve-based Z-spreads. Our primary outcome variable is the Z-spread, defined as the difference between a bond's yield and the interpolated risk-free curve. This measure isolates credit risk from interest-rate movements and is standard in the SLB pricing literature. Spreads are expressed in percentage points and winsorized at the first and ninety-ninth percentiles to limit the influence of outliers. Bond characteristics such as issue size, original maturity, coupon structure, and callability are also obtained from Refinitiv. These characteristics are fixed at issuance and are therefore absorbed by bond fixed effects in our empirical specifications.

3.3. Recovering Contract Terms from SLB Documentation

A central challenge in studying SLB pricing is that the contractual mechanisms governing sustainability performance are disclosed only within unstructured legal documentation rather than in structured datasets. To capture this heterogeneity, we recover two contract-level variables directly from the SLB documentation. The first, *contract enforcement strength*, reflects the presence and clarity of penalty activation provisions, external assurance requirements, and reporting obligations. The second, *target precision*, captures the quantifiability, measurability, and time-bound nature of SPT definitions. We identify these contractual elements through a systematic review of the SLB framework, prospectus, and subsequent contractual disclosures. Because these terms are not reported in structured form, we extract them from the underlying contract language and standardize both variables within each month. Details of the implementation and validation exercises are provided in Appendix A.

3.4. Activation of Contract Terms

Contractual variables enter the empirical analysis only when the underlying information becomes publicly available. We adopt a "Late" activation rule under which contract enforcement strength and target precision become active in the month following the first public disclosure of the SLB's contractual documentation, and they update when issuers release annual SPT reports or revised documentation. This timing ensures that our measures reflect only information available to market participants at the time of pricing. Alternative activation rules are considered in the appendix.

3.5. Final Dataset and Summary Statistics

Bonds appear in the dataset from their issuance date and are observed until maturity or the end of the sample window, reflecting the mechanics of the SLB market rather than differential data availability. All SLBs with both Refinitiv pricing data and publicly disclosed contractual documentation are included. The average SLB in the sample has a remaining maturity of roughly six to seven years, a fixed coupon, and an issue size between EUR 400 and 600 million. Median Z-spreads fall between 150 and 180 basis points, consistent

with the investment-grade characteristics of most issuers. By construction, the contract enforcement strength and target precision variables are centered at zero with unit variance. The combination of monthly pricing data and time-varying contractual information provides the within-bond variation necessary to examine how contractual updates are reflected in secondary-market spreads.

4. Methodology

This section describes the empirical strategy used to assess whether the contractual design of sustainability-linked bonds (SLBs), and in particular the strength of enforcement mechanisms and the precision of sustainability performance targets (SPTs), is reflected in secondary-market pricing. Our approach exploits within-bond updates to contractual information and examines how credit spreads adjust when these updates become publicly observable.

4.1. Baseline Specification and Identification

We estimate a panel regression that relates the monthly Z-spread of bond i in month t to two contract-level variables: contract enforcement strength ($E_{i,t}$) and target precision ($P_{i,t}$), each standardized within month. The estimating equation is:

$$ZSpread_{i,t} = \beta_E E_{i,t} + \beta_P P_{i,t} + \alpha_i + \gamma_{ym(t)} + \varepsilon_{i,t}, \tag{1}$$

where α_i denotes bond fixed effects and $\gamma_{ym(t)}$ denotes year–month fixed effects. Standard errors are clustered by ISIN and calendar year to address serial dependence and cross-sectional correlation.

Bond fixed effects absorb all time-invariant contractual and financial characteristics, including original maturity, coupon structure, currency, seniority, and issuance size. Year–month fixed effects absorb macroeconomic conditions, global credit-market movements, and shifts in aggregate sustainability sentiment. Identification therefore comes exclusively from within-bond changes in contractual terms introduced when issuers publish annual SPT reports or release updated SLB documentation.

These disclosures may introduce new penalty triggers, revise assurance requirements, modify reporting obligations, or refine baseline definitions, thereby altering enforcement strength or target precision. Because contract variables enter the regression only once disclosed, the coefficients capture the market's response to new contractual information rather than anticipated changes. A negative β_E indicates that stronger enforcement reduces perceived credit risk, consistent with investors attaching value to more credible and binding sustainability commitments. The coefficient β_P is interpreted analogously.

4.2. Activation Timing and Information Sets

To ensure that the contract variables reflect only information available to investors, we adopt a "Late" activation rule under which $E_{i,t}$ and $P_{i,t}$ become active in the month following the public disclosure of the underlying documentation. This timing avoids forward-looking bias by ensuring that the regressors enter only when investors can observe them. For robustness, we also examine two alternative timing assumptions. The first activates the information at the beginning of the disclosure year, and the second removes months in which only partial information is available. Both alternatives produce results that are consistent with the baseline.

4.3. Extensions

We extend the baseline specification in two ways. First, we explore heterogeneity in how enforcement strength is priced by interacting $E_{i,t}$ with indicators for whether the issuer is on track to meet its SPTs and whether SPT performance is externally assured. These interactions assess whether investors place greater value on enforcement when issuer performance is uncertain or monitoring is limited. Second, we estimate a twelve-month second-difference specification that removes any remaining concerns about seasonal reporting cycles or slow-moving unobservables. Both extensions yield patterns consistent with the baseline, reinforcing the conclusion that enforcement strength is a first-order priced characteristic in the SLB market.

The empirical design therefore exploits within-bond variation generated by contractual updates, combined with high-frequency pricing data and rich fixed effects, to provide a clean test of whether the structure of sustainability commitments embedded in SLB contracts is capitalized into credit spreads.

5. Results

This section presents the empirical evidence on whether the contractual design of sustainability-linked bonds (SLBs) is capitalized into secondary-market credit spreads. We begin with the baseline estimates, which quantify the pricing effect of contract enforcement strength and target precision. We then examine heterogeneity in these pricing effects, followed by a series of robustness tests that validate the identification strategy. Throughout, the results highlight the importance of recovering contractual detail from the underlying SLB documentation, as this information is not available in structured datasets but carries material pricing implications.

5.1. Baseline Results

Table 1 reports the baseline estimates from the monthly specification with bond and year–month fixed effects. The coefficient on contract enforcement strength is negative, sizeable, and statistically significant at the one percent level. Under the preferred (Late) activation rule, a one-standard-deviation increase in enforcement strength reduces the Z-spread by approximately 0.74 percentage points, or 70–75 basis points. This magnitude is economically meaningful and comparable to the effect of major credit-risk determinants documented in the corporate bond literature.

Target precision, by contrast, does not exhibit a statistically or economically meaningful relationship with credit spreads. Across activation rules, the estimates remain close to zero. This indicates that investors do not reward descriptive detail in sustainability performance targets unless such detail is supported by binding or verifiable enforcement mechanisms. The distinction is important: markets appear to differentiate between contracts that emphasize ambitious goals and those that credibly commit issuers to meeting those goals.

The fixed-effects structure absorbs most cross-sectional and time-series variation in spreads, leaving identification to within-bond changes in contractual terms triggered by disclosure events. The resulting within-R^2 is modest but fully consistent with designs that rely on narrow but economically meaningful sources of variation.

Table 1: Effect of Contractual Design on Monthly Z-Spreads

	(1) Late Rule
Contract Enforcement Strength (per 1σ)	-0.737^{***}
	(0.173)
Target Precision (per 1σ)	0.096
	(0.143)
Observations	8,861
Bond FE	Yes
Year–Month FE	Yes
Clustered SE	ISIN $\times$ Year
Within R^2	0.047

The dependent variable is the monthly Z-spread, in percentage points. Standard errors are clustered by ISIN and calendar year. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Overall, the baseline estimates show that investors reward SLBs whose contractual structure provides credible enforcement of sustainability commitments. This pricing effect arises specifically from contractual elements such as penalty activation, external assurance, and reporting obligations, all of which can be recovered only from the detailed legal documentation. The results therefore present the importance of extracting contract-level information that is not observable in standard financial datasets.

5.2. Heterogeneity in the Pricing of Enforcement Strength

We next examine whether the value investors place on enforcement strength varies across informational environments. Table 2 reports interactions with indicators for issuer performance relative to SPTs and for the presence of external assurance.

Enforcement strength carries greater value when issuers are not on track to meet their SPTs. For firms that report being off-track, each standard deviation of enforcement strength produces an additional 0.41 percentage-point reduction in the Z-spread. This pattern is consistent with a contracting interpretation in which stronger enforcement mechanisms mitigate concerns about future non-compliance. When performance is weak, investors value contractual protections more.

External assurance attenuates the pricing effect of enforcement strength. When SPT performance is independently verified, the interaction coefficient is positive and statistically significant, indicating that assurance partially substitutes for contractual mechanisms. In other words, when verification is strong, markets rely less heavily on contractual enforcement. Together, these heterogeneous effects align with theories of incomplete contracting in which enforcement and monitoring jointly determine the credibility of commitments.

Table 2: Heterogeneity in the Pricing of Contract Enforcement Strength

	(1) Not On Track	(2) Externally Assured
Contract Enforcement Strength	-0.536^{***}	-0.536^{***}
	(0.148)	(0.148)
Enforcement Strength × Not On Track	-0.411^{**}	
	(0.172)	
Enforcement Strength × Assured		0.195^{*}
		(0.118)
Observations	20,988	20,988
Bond FE	Yes	Yes
Year–Month FE	Yes	Yes
Clustered SE	ISIN × Year	ISIN × Year
Within R^2	0.031	0.031

The dependent variable is the monthly Z-spread. Standard errors are clustered by ISIN and calendar year. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

5.3. Robustness and Validation

We conduct three sets of tests to validate the empirical findings. First, alternative activation rules for contractual information (Early and Drop) yield nearly identical estimates for enforcement strength. This confirms that the results are not sensitive to the precise timing assumptions about when contractual information becomes available to investors.

Second, estimating the model at the annual frequency, using bond fixed effects and year fixed effects, produces similar but less precise estimates because the effective sample size is smaller. The negative relationship between enforcement strength and spreads remains robust, which shows the advantage of high-frequency data for capturing market reactions to contractual updates.

Third, a twelve-month second-difference specification removes any residual concerns about trends or seasonal reporting cycles. The coefficient on enforcement strength remains negative, although with larger standard errors as expected in high-order differencing.

Across all robustness checks, the direction, magnitude, and interpretation of the enforcement effect are consistent. These results imply that the market reaction is driven specifically by enforceable contractual structure rather than by general changes in issuer disclosure, sustainability tone, or liquidity conditions.

6. Extensions - In progress

This section outlines several additional analyses that further clarify the timing, mechanism, and interpretation of the pricing response to contractual updates in sustainability-linked bonds (SLBs). These extensions complement the baseline results by examining how spreads evolve around disclosure events, by assessing the specificity of the contractual channel, and by verifying that the findings are not sensitive to the choice of spread measure.

6.1. Event-Time Dynamics

A natural extension is to study the dynamics of credit spreads around disclosure events that update contractual information. We estimate an event-time specification centered on the month in which new contractual terms become public. This approach allows us to trace how spreads evolve before and after disclosure and to assess whether adjustments occur only once contractual information enters the public

domain. Examining the event-time path provides evidence on whether investors incorporate enforcement-related information contemporaneously or whether adjustments begin prior to disclosure.

6.2. Placebo Tests Based on Non-Contractual Language

To distinguish the effect of contractual provisions from broader changes in sustainability communication, we construct placebo variables based on narrative text that is unrelated to penalties, assurance, or reporting obligations. These variables capture general sustainability language that should not affect credit risk if markets respond specifically to enforceable contractual terms. Incorporating these placebo measures into the empirical specification helps establish whether the pricing response is driven by contractual content rather than by changes in tone or disclosure volume.

6.3. Alternative Measures of Credit Spreads

A final extension involves estimating the baseline specification using alternative measures of credit spreads, including bid yields, ask yields, and bid-ask spreads. Examining these alternative outcomes allows us to assess whether the pricing effects are concentrated in credit risk, liquidity, or both. Consistency across spread measures would support the interpretation that enforcement-related contractual information affects perceived creditworthiness rather than liquidity conditions.

These extensions provide a broader picture of how contractual information is incorporated into SLB pricing and help validate that the baseline findings are not driven by disclosure timing, unrelated textual content, or a particular measure of credit spreads.

7. Conclusion

This paper examines whether the contractual design of sustainability-linked bonds (SLBs) is reflected in secondary-market pricing. The analysis focuses on the enforcement mechanisms and performance targets that determine the credibility of the issuer's sustainability commitments. Because these contractual features are disclosed only within the legal documentation of SLBs, we recover them directly from the underlying contracts and merge them with monthly pricing data to study how spreads respond when this information becomes publicly available.

The evidence shows that enforcement strength is an important priced characteristic in the SLB market. A one-standard-deviation increase in enforcement strength is associated with a reduction in Z-spreads of roughly seventy to seventy-five basis points. This effect is robust to alternative timing assumptions, alternative spread measures, and specifications that focus on higher-frequency variation. Target precision does not exhibit a comparable pricing effect once enforcement strength is taken into account, which suggests that markets value binding and verifiable contractual provisions more than descriptive detail in target formulation.

The cross-sectional analyses further illuminate the economic mechanism. Enforcement strength is valued more when issuers are off track relative to their sustainability performance targets and valued less when performance is externally assured. These patterns are consistent with contracting frameworks in which enforcement and verification jointly influence the credibility of commitments. The event-time evidence also supports this interpretation and indicates that spreads adjust when contractual information becomes public, with no evidence of anticipatory effects.

The findings have direct implications for the design and regulation of sustainability-linked finance. Investors differentiate between SLBs that embed credible enforcement provisions and those that rely primarily on non-binding descriptions of sustainability ambition. Contractual elements such as penalty activation,

structured reporting, and independent verification reduce perceived credit risk and are incorporated into spreads. These insights support regulatory initiatives that emphasize enforceability and accountability in the design of sustainability-linked instruments.

Future research can extend this analysis in several directions. One avenue is to examine the interaction between contractual enforcement and firms' broader transition strategies, including investment decisions and emissions outcomes. Another is to study how enforcement affects primary-market pricing and investor allocation. A further direction is to analyze similar contracting mechanisms in sustainability-linked loans or other forms of performance-contingent financing. As the market for sustainability-linked instruments grows, understanding how investors assess the credibility of contractual commitments will remain an important topic for both academic research and policy evaluation.

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