

The Hidden Credit Cost of Green Commitments

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Abstract

Green commitments are imperfect public signals that can increase the value of private information about firms' transition capacity. Using U.S. corporate bond data covering 2013 to 2025, I find that bond repricing following green commitments is largely hidden in average credit spreads across outstanding bonds. Instead, the long-short spread differential widens after commitment and contains incremental predictive information about subsequent emissions improvements. Offering-spread changes on newly issued bonds are also more positive at longer maturities. I also provide trading-based evidence that customer order flow is followed by a larger yield response for longer relative to shorter maturities. The findings are consistent with investors trading on transition-related information after green commitments.

Keywords: Green Commitments, Credit Curve, Order Flow, Information

JEL Classification: G12, G30, D82.

1 Introduction

Green commitments are imperfect public signals about firms’ future transition actions. The commitment itself is observable: market participants can see that a firm has pledged to develop a climate target and submit it for validation. What remains uncertain is whether the resulting target will be credible and whether the firm has the organizational and operating capacity to implement the transition. This uncertainty matters to creditors because transition costs and feasibility can affect future cash flows and the firm’s capacity to service its debt (Bolton and Kacperczyk, 2023; Seltzer et al., 2022). A commitment supported by strong implementation capacity may indicate greater transition preparedness, whereas limited capacity may expose creditors to higher costs and execution risk. In disclosure models, public signals can alter investors’ incentives to acquire and trade on additional information (Diamond, 1985; Banerjee et al., 2018; Banerjee et al., 2023). This motivates the question of how information about firms’ transition capacity is incorporated into corporate bond prices following voluntary green commitments, how it is reflected in secondary-market trading and price discovery, and whether maturity-dependent repricing also appears in offering spreads on newly issued debt.

This question builds on two strands of climate asset-pricing research. One strand studies the pricing of emissions, climate risk, environmental performance, and certified green securities (Bolton and Kacperczyk, 2021; Bolton and Kacperczyk, 2023; Huynh and Xia, 2021; Seltzer et al., 2022; Larcker and Watts, 2020; Flammer, 2021). A more recent strand studies forward-looking green commitments, including which firms make such commitments, how equity markets respond to their announcements, and whether committing firms subsequently reduce emissions (Bolton and Kacperczyk, 2025; Bauer et al., 2026). Together, these studies show that environmental characteristics and commitments about future transition actions contain information relevant to asset prices and subsequent environmental outcomes. However, firm-level market responses do not by themselves reveal how this information is priced across economic horizons. In corporate bond markets, an issuer-level average can conceal relative repricing across maturities even

when the average spread changes little. This limitation matters for green commitments because their targets, investments, and environmental outcomes typically unfold over many years. I therefore study how information about firms' transition capacity is priced across bond maturities following green commitments.

Beyond identifying where repricing occurs, I examine how customer order flow is related to subsequent bond-yield adjustment following green commitments. If commitment increases the value of private information about transition capacity, investors have stronger incentives to acquire and trade on it, and their order flow can make prices more informative (Grossman and Stiglitz, 1980; Kyle, 1985; Bond et al., 2012; Bond and Goldstein, 2015). This mechanism may be relevant following green commitments because transition capacity remains uncertain while its consequences for creditor payoffs can increase. Existing studies of green commitments focus primarily on valuation responses and subsequent environmental outcomes, leaving their implications for secondary-market trading less understood (Bolton and Kacperczyk, 2025; Bauer et al., 2026). I therefore use customer order flow to examine whether subsequent yield responses to customer sell pressure become more positive with maturity after commitment, and whether this pattern appears across trading horizons.

To organize the empirical analysis, I develop a partial-equilibrium model of information acquisition, informed trading, and bond pricing, building on Grossman and Stiglitz (1980) and Kyle (1985). The model considers a firm with unobserved transition capacity and bonds of different maturities with different exposures to future transition consequences. Investors can acquire costly signals about transition capacity and trade on them in dealer markets.¹ Because longer-maturity bonds are exposed to a larger share of transition consequences, information about transition capacity can be more valuable for these bonds. When the increase in capacity exposure outweighs any reduction in residual uncertainty, commitment increases information acquisition and contemporaneous price impact. Under the conditions derived below, the increase in price impact is greater for longer-maturity bonds. The model also allows expected implementation burdens and

¹Information acquisition is a modeling mechanism rather than a directly observed empirical object. The trading model concerns contemporaneous price responses to order flow; the empirical analysis examines subsequent yield changes.

commitment benefits to largely offset in average spreads while producing a steeper credit curve.

To examine these implications, I combine U.S. corporate bond data from 2013 to 2025 with SBTi commitment and target-validation histories, corporate emissions, and Enhanced TRACE transactions.² The main bond sample contains 73,293 bond-month observations covering 1,802 bonds issued by 151 firms.

The empirical analysis yields three main findings. First, issuer credit curves steepen after green commitments, while average spread changes are statistically insignificant. In the baseline continuous specification, postcommitment spread changes within an issuer are 4.64 basis points more positive per ten additional years of remaining maturity at commitment. In the primary market, postcommitment changes in offering spreads are 40.57 basis points more positive per ten additional years of maturity at issuance, relative to issuers that commit later. The credit curve also contains incremental predictive information about subsequent emissions improvement. In the baseline emissions specification, a one-standard-deviation increase in adjusted credit-curve innovations aggregated over the preceding twelve months predicts 0.049 log points greater Scope 1 emissions improvement and 0.047 log points greater Scope 1+2 improvement relative to the out-of-sample benchmark forecast.

Second, customer sell pressure is followed by more positive subsequent yield changes for longer-maturity bonds after commitment. Using a common sample across horizons, the post-minus-pre change in the yield response to a one-unit increase in sell pressure is 2.08 basis points per ten additional years of maturity over the next hour, 1.88 basis points by the next observed trading day, and 2.29 basis points by the fifth observed trading day. All three estimates are statistically significant at the 1% level. Economically, the results indicate that trading after commitment is associated with a more positive yield response at longer maturities, consistent with transition-related information being reflected more strongly in the relative pricing of long-maturity bonds.

²The Science Based Targets initiative (SBTi) sets standards and provides validation services for corporate emissions-reduction targets. I treat a firm's first public SBTi commitment as its public commitment to develop and submit a science-based target for validation, and its subsequent target validation as an external assessment of that target. Validation does not verify subsequent implementation.

Third, I use public SBTi target validation, which provides an external assessment of a firm’s transition target, to examine whether transition-related information is reflected differently across bond maturities.³ I compare validated issuers with already committed issuers that receive validation later. Relative to these controls, post-validation credit-spread changes are 2.32 basis points more positive per ten additional years of remaining maturity at validation over one trading day and 2.14 over five trading days. The pre-validation placebo estimate is statistically insignificant.

Taken together, the evidence points to maturity-dependent repricing following green commitments, while issuer-wide average spread changes are statistically insignificant. The emissions and validation results support a transition-related interpretation of this repricing, while the order-flow results are consistent with a trading channel through which such information enters bond prices. The evidence also has a potential governance implication. A voluntary green commitment may increase investors’ incentives to assess whether the firm has the operational and financial capacity to deliver on its stated objective. Such information may be especially valuable for longer-maturity bonds because their values are more exposed to future transition consequences. If investors demand higher spreads on new debt from firms that cannot deliver on their green commitments, firms may be less willing to make promises they cannot keep.⁴

The paper makes three contributions. First, it develops a partial-equilibrium model linking green commitments to information acquisition and bond pricing. Commitment can reduce uncertainty about transition capacity while making that capacity more important for debt repayment. By linking bond maturity to exposure to future transition consequences, the model identifies when commitment increases information acquisition and when contemporaneous price impact rises more for longer-maturity bonds.

Second, the paper contributes to climate finance and asset pricing by examining how repricing after green commitments varies across bond maturities. Within-issuer comparisons reveal maturity-specific credit-spread changes that issuer-wide averages can

³SBTi validation assesses whether a submitted target satisfies the applicable criteria. It does not guarantee that the firm will achieve the target or endorse the means chosen to do so.

⁴The model takes the firm’s commitment and financing decisions as given. These governance implications are not equilibrium predictions of the model and are not directly tested in the empirical analysis.

miss. Evidence from offering spreads further shows that a similar maturity pattern extends to newly issued debt, connecting secondary-market repricing to primary-market financing terms.

Third, the paper connects climate finance with information and market microstructure research. I use customer order flow to examine how the relation between sell pressure and subsequent yield changes varies across maturities after commitment. This adds a price-formation perspective to explanations based on expected cash flows, discount rates, and investor preferences.

2 Related Literature

This paper relates to three strands of literature. The first studies climate information in asset prices. Existing work examines the pricing of emissions, climate and regulatory risks, and environmental performance (Chava, 2014; Engle et al., 2020; Bolton and Kacperczyk, 2021; Bolton and Kacperczyk, 2023; Huynh and Xia, 2021; Seltzer et al., 2022), as well as green securities and certified environmental attributes (Larcker and Watts, 2020; Flammer, 2021). More recent work studies forward-looking corporate commitments, including which firms commit, how markets respond, and whether committing firms subsequently improve their environmental performance (Bolton and Kacperczyk, 2025; Bauer et al., 2026). This paper adds a maturity dimension to this literature. Bonds of the same issuer differ in their exposure to future transition consequences, allowing the corporate bond term structure to reveal how the pricing response to green commitments varies across maturities.

The second strand studies voluntary disclosure and endogenous information production. Classic models emphasize that disclosure is chosen by the firm and that the disclosure decision itself may convey information (Verrecchia, 1983; Dye, 1985). Subsequent work shows that public disclosure can affect investors' incentives to acquire private information, trade on that information, and thereby influence price informativeness (Diamond, 1985; Kim and Verrecchia, 1994; Banerjee et al., 2018; Banerjee et al., 2023). This perspective is particularly relevant for green commitments

because the public commitment does not fully reveal the firm’s transition capacity. I use this framework to study how an incomplete commitment can affect subsequent trading and credit pricing even when the announcement itself does not resolve uncertainty about future transition outcomes.

The third strand studies the term structure and information incorporation in corporate bond markets. Credit spreads vary across maturities with default risk, liquidity, and the issuer’s information environment (Leland and Toft, 1996; Duffee, 1998; Longstaff et al., 2005; Yu, 2005). A related market microstructure literature studies how information is reflected in prices through trading and order flow (Grossman and Stiglitz, 1980; Kyle, 1985; Hotchkiss and Ronen, 2002; Bessembinder et al., 2006). I connect these perspectives by using the issuer credit curve to identify where repricing occurs across maturities and customer order flow to examine whether trading is followed by stronger price adjustment in longer-maturity bonds after commitment.

The remainder of the paper is organized as follows. Section 3 develops the model and testable predictions. Section 4 describes the data and variable construction. Section 5 presents the empirical design. Section 6 reports the main results. Section 7 presents robustness checks. Section 8 concludes.

3 Model

I develop a partial-equilibrium model of transition implementation, information acquisition, and bond pricing, building on Grossman and Stiglitz (1980) and Kyle (1985). A public green commitment strengthens the consequences of failing to implement a transition target, making the firm’s implementation capacity more important for repayment. Public information accompanying the commitment also changes investors’ assessment of that capacity. The model distinguishes the expected implementation burden, which affects public valuation, from uncertainty about that burden, which affects the value of private research and informed trading.

Bond maturity enters through exposure to the cumulative consequences of implementation. Greater exposure can increase the value of information for trading, while

its effect on annualized credit spreads also depends on maturity and expected repayment. The model takes the commitment and financing decisions as given. Its comparisons condition on public information and do not presume that a voluntary commitment necessarily conveys favorable news.

3.1 Economic Environment

The economy contains a firm, bond investors, and competitive, risk-neutral dealers. The firm has two zero-coupon bonds, indexed by $m \in \{S, L\}$, with maturities $T_L > T_S$ and face values F_m . Transition capacity is $\theta > 0$: higher capacity lowers the cost of implementing a given transition action. The firm observes θ , whereas investors and dealers do not.

There are two regimes, $C \in \{0, 1\}$, before and after commitment. Public information is $\mathcal{I}_C$, with

$$\bar{\theta}_C = E[\theta \mid \mathcal{I}_C], \quad \sigma_C^2 = \text{Var}(\theta \mid \mathcal{I}_C) > 0. \quad (1)$$

The prior has positive support and finite second moments. Information accompanying commitment may include

$$r = \theta + \nu, \quad \nu \sim N(0, \pi^{-1}), \quad \pi > 0, \quad (2)$$

where ν is independent of capacity and prior public information. The signal changes beliefs about capacity without changing capacity itself. Bayesian updating is described in [B.1](#).

Timing. Investors observe public information, choose private research, receive their signals, and trade. Dealers initially price each bond using the order flow available to them. An extension allows information from different dealers to be aggregated after initial trading. The firm subsequently implements its transition action before either bond matures. Investors anticipate that action; secondary-market prices do not enter the implementation decision.

Transition implementation. For a target $\bar{a} > 0$, the firm chooses $a \geq 0$ to minimize implementation costs and the resource losses associated with deviating from the target:

$$B_C^*(\theta) = \min_{a \geq 0} \left\{ \frac{a^2}{2\theta} + \frac{\phi_C}{2}(\bar{a} - a)^2 \right\}, \quad \phi_1 > \phi_0 \geq 0. \quad (3)$$

Both terms are costs to the firm's resources. The parameter ϕ_C captures the consequences of failing to meet the target, specified independently of secondary-market prices. Commitment strengthens implementation incentives without directly raising capacity.

The optimal action and minimized burden are

$$a_C^*(\theta) = \frac{\phi_C \theta}{1 + \phi_C \theta} \bar{a}, \quad (4)$$

$$B_C^*(\theta) = \frac{\phi_C \bar{a}^2}{2(1 + \phi_C \theta)}. \quad (5)$$

At fixed capacity, commitment increases implementation and the minimized burden. Within a regime with $\phi_C > 0$, higher capacity increases implementation and reduces the burden. Define

$$d_C(\theta) \equiv -\frac{\partial B_C^*(\theta)}{\partial \theta} = \frac{\phi_C^2 \bar{a}^2}{2(1 + \phi_C \theta)^2}. \quad (6)$$

At any given $\theta > 0$, $d_1(\theta) > d_0(\theta)$: capacity differences have larger cost consequences after commitment. Appendix B.2 gives the derivations.

Expected burden and residual uncertainty. Define

$$\mathcal{B}_C = E[B_C^*(\theta) \mid \mathcal{I}_C], \quad Q_C^2 = \text{Var}(B_C^*(\theta) \mid \mathcal{I}_C), \quad (7)$$

and the centered burden reduction

$$w_C = \mathcal{B}_C - B_C^*(\theta), \quad E[w_C \mid \mathcal{I}_C] = 0, \quad \text{Var}(w_C \mid \mathcal{I}_C) = Q_C^2. \quad (8)$$

For $\phi_C > 0$, w_C is an increasing transformation of capacity. It introduces no additional firm characteristic.

Stronger implementation requirements raise the burden at a given capacity and increase its dispersion under unchanged beliefs, while sufficiently favorable public information can lower its conditional expectation. The change in Q_C depends on both the implementation problem and the updated distribution of capacity. Consequently, a

lower expected burden can coexist with greater remaining uncertainty about that burden. These are conditional possibilities, rather than consequences of every commitment.

Bond payoffs and maturity. Let $G_m = G(T_m)$. Resources available for repayment and bond payoffs are

$$A_{mC} = \bar{A}_m + R_C - G_m B_C^*(\theta) + \xi_m, \quad X_{mC} = h_m(A_{mC}) \in [0, F_m], \quad (9)$$

where h_m is nondecreasing and $E[\xi_m \mid \theta, \mathcal{I}_C] = 0$. The term R_C collects other publicly known resources, excluding costs in B_C^* , and is independent of the implementation choice and secondary-market prices. The share of implementation consequences realized by maturity satisfies

$$0 < G(T) \leq 1, \quad G'(T) > 0. \quad (10)$$

Using a positive repayment slope $\delta_m = h'_m(A_m^\circ)$ at a fixed resource reference, the centered local payoff is

$$X_{mC} \simeq E[X_{mC} \mid \mathcal{I}_C] + \delta_m G_m w_C + \varepsilon_m, \quad \varepsilon_m = \delta_m \xi_m. \quad (11)$$

This approximation preserves the nonlinear implementation burden. Its capacity exposure at a given θ is

$$D_{mC}(\theta) = \delta_m G_m d_C(\theta). \quad (12)$$

If $\delta_L G_L > \delta_S G_S$, long-maturity payoffs have greater capacity exposure whenever $\phi_C > 0$, and commitment increases their exposure more. These comparisons concern repayment; annualized spread effects require a separate conversion.

Credit spreads. Let $v_m > 0$ be the risk-free discount factor to maturity T_m , measured in years. Define the public-information reference price and its continuously compounded credit spread by

$$P_{mC}^0 = v_m E[X_{mC} \mid \mathcal{I}_C] > 0, \quad S_{mC} = -\frac{1}{T_m} \log \left(\frac{P_{mC}^0}{v_m F_m} \right). \quad (13)$$

At fixed reference expected repayment $\mu_m^\circ > 0$, a first-order expansion gives

$$S_{mC} \simeq \alpha_m - \beta_m R_C + \ell_m \mathcal{B}_C, \quad \beta_m = \frac{\delta_m}{T_m \mu_m^\circ}, \quad \ell_m = \beta_m G_m. \quad (14)$$

The constants and conversion coefficients are held fixed across regimes. Appendix B.3 derives this expression.

Write Δ for regime 1 minus regime 0. For fixed issuer weights $\omega_m \geq 0$, $\sum_m \omega_m = 1$, let $\bar{S}_C = \sum_m \omega_m S_{mC}$ and $K_C = S_{LC} - S_{SC}$. Then

$$\Delta \bar{S} \simeq - \sum_m \omega_m \beta_m \Delta R + \sum_m \omega_m \ell_m \Delta \mathcal{B}, \quad (15)$$

$$\Delta K \simeq -(\beta_L - \beta_S) \Delta R + (\ell_L - \ell_S) \Delta \mathcal{B}. \quad (16)$$

The general comparison therefore allows either direction of average spread changes. To isolate capacity information, consider $\Delta R = 0$.

Proposition 1. *With $\Delta R = 0$, in the local spread approximation, if*

$$\Delta \mathcal{B} < 0, \quad \ell_S > \ell_L, \quad (17)$$

then

$$\Delta S_S < \Delta S_L < 0, \quad \Delta K > 0. \quad (18)$$

Thus a sufficiently favorable revision in expected implementation costs can lower both spreads while lowering the short-maturity spread more. The condition $\ell_S > \ell_L$ can hold alongside $\delta_L G_L > \delta_S G_S$, because annualized spreads also divide the repayment effect by maturity and reference expected repayment. Greater cumulative exposure does not alone determine the ranking of annualized spread changes.

3.2 Information Acquisition and Trading

The trading block uses a Gaussian approximation to the centered burden reduction: $\tilde{w}_C \mid \mathcal{I}_C \sim N(0, Q_C^2)$. This proxy matches the first two moments of w_C ; it does not assume that positive capacity or the bounded implementation burden is exactly Gaussian. The local date-0 bond value is

$$V_{mC} = P_{mC}^0 + H_m \tilde{w}_C + \epsilon_{mC}, \quad H_m = v_m \delta_m G_m, \quad (19)$$

where ϵ_{mC} has conditional mean zero and is independent of the common proxy, signal noises, and liquidity orders. Prices, profits, and research costs use date-0 currency. Cross-maturity comparisons use a common face-value convention.

Each strategic investor trades only her assigned bond. In the baseline, a dealer observes only that bond's order flow before pricing. The investor publicly chooses $e_{mC} \in [0, 1]$, pays $\chi_m e_{mC}^2/2$, and receives a private signal, where $\chi_m > 0$. Let

$$z_{mC} = E[\tilde{w}_C \mid s_{mC}, \mathcal{I}_C, e_{mC}], \quad E[z_{mC} \mid \mathcal{I}_C, e_{mC}] = 0, \quad \text{Var}(z_{mC} \mid \mathcal{I}_C, e_{mC}) = e_{mC}^2 Q_C^2. \quad (20)$$

Thus e_{mC}^2 is the fraction of residual burden variance resolved by research about implementation capacity. Appendix B.4 specifies the signal. Private signal noises are independent across investors.

The investor submits q_{mC} , and independent liquidity demand is $u_{mC} \sim N(0, \sigma_{u,m}^2)$, with $\sigma_{u,m} > 0$. The dealer observes $y_{mC} = q_{mC} + u_{mC}$, where positive flow denotes net customer buying. Suppressing subscripts, optimal trading and competitive pricing satisfy

$$\max_q E[q(V - p) \mid s, \mathcal{I}, e], \quad p = E[V \mid y, \mathcal{I}, e]. \quad (21)$$

Lemma 1. *For $H > 0$, $Q > 0$, and $e > 0$, the unique linear equilibrium is*

$$q = bz, \quad p = P^0 + \lambda y, \quad b = \frac{\sigma_u}{eQ}, \quad \lambda = \frac{HeQ}{2\sigma_u}. \quad (22)$$

Expected gross trading profit is $\Pi^G(e) = \sigma_u H Q e / 2$.

Optimal research and equilibrium price impact are

$$e_{mC}^* = \min \left\{ \frac{\sigma_{u,m} H_m Q_C}{2\chi_m}, 1 \right\}, \quad \lambda_{mC}^* = \frac{H_m Q_C}{2\sigma_{u,m}} e_{mC}^*. \quad (23)$$

When $Q_C = 0$, optimal research and informational price impact are zero. For interior research choices,

$$\lambda_{mC}^* = \frac{v_m^2 \delta_m^2 G_m^2 Q_C^2}{4\chi_m}. \quad (24)$$

To express price impact in annualized yield units, set $P_m^\circ = v_m \mu_m^\circ$ and define

$$\mathcal{L}_{mC} = \frac{\lambda_{mC}^*}{T_m P_m^\circ}, \quad \Omega_m = \frac{v_m \delta_m^2 G_m^2}{\chi_m T_m \mu_m^\circ}. \quad (25)$$

The coefficient $\mathcal{L}_{mC}$ is the local yield increase per unit of net customer selling. With fixed discount factors, the yield and credit-spread changes coincide.

Proposition 2. *Suppose research choices are interior and v_m , δ_m , G_m , $\sigma_{u,m}$, χ_m , and μ_m° are fixed across regimes. Research and price impact increase after commitment if and only if $Q_1 > Q_0$. Under this condition,*

$$\mathcal{L}_{m1} - \mathcal{L}_{m0} = \frac{\Omega_m}{4}(Q_1^2 - Q_0^2), \quad (26)$$

and the increase is greater for long-maturity bonds if $\Omega_L > \Omega_S$.

Expected burden changes enter public valuation through G_m ; endogenous research makes price impact depend on G_m^2 . Consequently, $\ell_S > \ell_L$ and $\Omega_L > \Omega_S$ can hold together. For equal $\delta_m, \mu_m^\circ, \chi_m$ across maturities, a sufficient joint condition is

$$\sqrt{\frac{T_L v_S}{T_S v_L}} < \frac{G_L}{G_S} < \frac{T_L}{T_S}. \quad (27)$$

Under these conditions, a lower expected burden can produce a larger short-maturity spread decline while greater residual burden uncertainty produces a larger long-maturity trading response. Neither comparison follows from maturity alone.

Competitive pricing also gives

$$E[p_{mC} \mid \mathcal{I}_C, e_{mC}^*] = P_{mC}^0. \quad (28)$$

Private information changes price responsiveness without mechanically moving mean prices away from their public benchmark.⁵

Subsequent price adjustment. To connect order flow with later price revisions, consider an extension with two dealers per bond. Orders are submitted simultaneously; each dealer initially observes only its own flow, and bilateral quotes are not publicly available before execution. The investor uses one private signal to trade with both dealers, pays the research cost once, and faces independent liquidity orders of variance $\sigma_{u,m}^2$ at each dealer. Information from both bond markets is subsequently pooled publicly.

⁵This is a statement about mean prices, not an identity for mean spreads. Yield comparisons use a local expansion around positive prices.

For a given positive precision, each dealer has the trading coefficients in Lemma 1. Total expected gross profit doubles, so optimal precision in this extension is

$$\hat{e}_{mC} = \min \left\{ \frac{\sigma_{u,m} H_m Q_C}{\chi_m}, 1 \right\}. \quad (29)$$

Let $Y_m = y_{m1} + y_{m2}$ and $\bar{p}_m^{\text{init}} = (p_{m1}^{\text{init}} + p_{m2}^{\text{init}})/2$. After all dealer flows are disclosed, each bond's price is the conditional expectation of V_{mC} given those flows. Denote this price by p_m^{pool} . Conditioning also on public information and observed precision choices, Appendix B.5 shows that

$$E[p_m^{\text{pool}} - \bar{p}_m^{\text{init}} | Y_m] = \rho_{mC} Y_m, \quad \rho_{mC} = \frac{H_m \hat{e}_{mC} Q_C}{12 \sigma_{u,m}}. \quad (30)$$

For interior choices,

$$\rho_{mC} = \frac{H_m^2 Q_C^2}{12 \chi_m}, \quad \frac{\rho_{mC}}{T_m P_m^\circ} = \frac{\Omega_m Q_C^2}{12}. \quad (31)$$

Aggregate customer selling therefore predicts a subsequent yield increase, with a larger post-commitment increase in this response when $Q_1 > Q_0$ and $\Omega_L > \Omega_S$. Initial dealer prices remain efficient given their own information: the predictive content comes from aggregate flow that no individual dealer initially observes. Once the information is pooled, further rational updates have zero expected price revision conditional on the pooled information.

3.3 Empirical Implications

The model separates changes in expected implementation costs from changes in the value of investigating those costs. Public valuation depends on $\mathcal{B}_C$, while research and trading depend on Q_C and maturity-specific payoff exposure. A commitment can therefore change relative pricing and trading responses without imposing a common direction on all spread changes.

The conditions $\Delta \mathcal{B} < 0$, $\ell_S > \ell_L$, $Q_1 > Q_0$, and $\Omega_L > \Omega_S$ jointly imply narrower spreads, a steeper credit curve, and a larger increase in the long-maturity response to customer selling. These conditions describe a particular regime comparison within the

model. They do not assume that every commitment improves public assessments or increases private research.

The baseline trading mechanism concerns contemporaneous price formation; the aggregation extension provides a source of subsequent adjustment. Applying either mechanism requires matching the sign and scale of order flow and converting prices into yields using the relevant duration.⁶ Order-flow responses can thus provide evidence consistent with information being incorporated into bond prices, while information acquisition itself remains a modeling mechanism rather than a directly observed empirical object.

4 Data and Measurement

4.1 Data Sources and Sample Construction

I combine SBTi commitment histories with corporate bond prices and returns from WRDS, bond characteristics from FISD, transactions from Enhanced TRACE, emissions from S&P Global Trucost, and firm characteristics from Compustat. The main pricing sample covers June 2013 through June 2025, within 24 months before and after each firm’s first public SBTi commitment, excluding the commitment month.

I retain publicly traded, fixed-rate U.S. corporate debentures and medium-term notes outstanding at commitment. I exclude convertible, asset-backed, foreign-currency, preferred, privately placed, and Rule 144A securities (Dick-Nielsen et al., 2012).⁷

I link SBTi firms to FISD using security identifiers or, when unavailable, unique issuer-name matches. Eligible bonds include those issued by matched firms and their financing subsidiaries; I then link these bonds to TRACE.

The final sample requires complete regression variables, observations on both sides of commitment for each issuer–bond pair, and at least two distinct bond maturities per

⁶For the model’s zero-coupon bonds and continuously compounded yields, the conversion is $dS = -dp/(Tp)$ at fixed risk-free yields. Coupon-bond applications use the price sensitivity appropriate to their yield convention. Standardized customer imbalance is not numerically identical to the model’s order quantity.

⁷Callable bonds are retained. Bonds issued after commitment enter the separate new-debt analysis.

issuer-month. It contains 73,293 bond-month observations on 1,802 bonds issued by 151 firms, spanning 6,750 issuer-months.

4.2 Green Commitments

The event date is the earliest usable record of an issuer’s first public SBTi commitment: an intention to develop a science-based emissions target and submit it for validation. A commitment is distinct from target validation and does not establish that emissions reductions have been implemented.⁸

The post-commitment period begins in the following calendar month, with the commitment month excluded. The target-validation analysis instead uses the exact validation date and excludes the release date.

4.3 Credit Spreads and the Issuer Credit Curve

The monthly outcome is the Treasury-matched credit spread, measured in basis points as the WRDS-reported bond yield minus a Treasury yield matched by remaining maturity. I construct the benchmark by linearly interpolating Treasury constant-maturity par yields.⁹

I examine average issuer spreads and relative spreads across maturities. The main maturity measure is remaining maturity at commitment, fixed throughout the event window and expressed in ten-year units. The binary measure identifies bonds strictly above the issuer-specific median commitment-date maturity among eligible bonds.

The bond-control set comprises log amount outstanding, credit rating, and duration. The fully controlled specification without issuer-by-month fixed effects also includes issuer size, leverage, cash holdings, profitability, market-to-book, free cash flow, and capital expenditures.¹⁰

⁸The SBTi Target Dashboard distinguishes *Committed*, *Targets Set*, and *Commitment Removed*. I retain the first public commitment date regardless of subsequent status.

⁹I use the 1-, 2-, 3-, 5-, 7-, 10-, 20-, and 30-year rates. Bonds with less than one year remaining are matched to the one-year rate. Remaining maturity is restricted to 0.25–30 years. Spreads are not adjusted for embedded call options.

¹⁰Annual accounting variables enter six months after fiscal year-end. Free cash flow is operating cash flow minus capital expenditures, scaled by assets. [Appendix A](#) defines all variables.

4.4 Bond Trading and Information Measures

I use Enhanced TRACE to relate customer trading to subsequent bond-yield changes. It reports transaction prices, yields, par amounts, execution times, and counterparty types. I reconstruct transaction histories, removing cancellations, reversals, and superseded corrections. [Appendix C](#) details the procedures.

Customer buys are dealer-reported sells to customers, and customer sells are dealer-reported buys from customers. At the bond-hour level, net customer sell pressure is customer sell volume minus buy volume, divided by total customer volume. It ranges from -1 to 1 , with positive values indicating net selling.

I measure cumulative yield changes, in basis points, from the last observed yield in the order-flow hour to the last observed yield in the next hour, the next observed trading day, and the fifth observed trading day for the same bond. I test whether the maturity gradient in this order-flow–yield relation increases after commitment.¹¹

The cleaned TRACE data span 2013–2025. Trading follows the same 24-month event window, excluding the commitment month. The main order-flow specifications use a common sample of 272,238 bond-hour observations covering 822 bonds from 86 issuers. Future-order-flow placebos additionally require an observed future trading interval for the same bond.

5 Empirical Design

5.1 Green Commitments and Credit-Curve Repricing

I estimate average spread changes and maturity-dependent repricing, respectively, using

$$Spread_{bit} = \beta_A Post_{it} + \Gamma'_B B_{bit} + \Gamma'_F F_{it}^{avail} + \mu_b + \tau_t + \varepsilon_{bit}, \quad (32)$$

¹¹The fully controlled specifications include log trade counts, log average trade size, price dispersion, the large-trade share, the interdealer volume share, and dealer report-side imbalance. Each enters in levels and interacted with post-commitment status, maturity, and their product.

and

$$Spread_{bit} = \beta_C(Post_{it} \times Maturity_{bi}) + \Gamma' B_{bit} + \mu_b + \alpha_{it} + \varepsilon_{bit}. \quad (33)$$

Variables and event-window restrictions follow Section 4. Both equations include bond fixed effects, μ_b . The first adds calendar-month effects, τ_t , and the second issuer-month effects, α_{it} . Thus, β_A measures the average within-bond spread change, and β_C the change in the within-issuer spread gradient per ten additional years of commitment-date maturity. Above-median maturity and event-time specifications complement the continuous design.

For newly issued bonds, I stack commitment events with issuers committing 13–24 months later, using a twelve-month window on either side of the treated event and excluding its month. The coefficient on $Treated \times Post \times (\text{OriginalMaturity}/10 - 1)$ measures the treated-control difference in the change in offering-spread maturity gradients. The regressions include nonabsorbed lower-order terms, issuer-by-stack and stack-by-calendar-month fixed effects; controlled specifications add log offering amount and callable status.¹² Standard errors for the monthly pricing and issuance regressions are clustered by issuer and calendar month.

5.2 Credit-Curve Information and Future Emissions

AdjCI is the reliability-weighted residual from a model of monthly changes in issuer credit-spread maturity slopes, fitted only to earlier calendar years. I aggregate it over the final $h \in \{1, 3, 6, 12\}$ months ending at the last complete calendar month on or before fiscal-year-end F , and standardize each signal using pre-commitment observations.

The dependent variable, $Surprise_{i,F+1}$, is actual emissions improvement, $\log(1 + E_{iF}) - \log(1 + E_{i,F+1})$, minus its recursively estimated benchmark forecast. The benchmark excludes AdjCI; positive surprise therefore denotes improvement above that benchmark. I estimate

$$Surprise_{i,F+1} = \alpha_i + \delta_{F+1} + \lambda Post_{iF} + \beta AdjCI_{iF}^{(h)} + \Pi' X_{iF} + \varepsilon_{i,F+1}. \quad (34)$$

¹²In both stacked analyses, weights balance treated and control groups within each stack, with equal issuer weights within groups and equal bond weights within issuer-stacks.

X_{iF} contains firm characteristics and available three-year average emissions. [Appendix A](#) details these controls, signal construction, and benchmark estimation under the June and October emissions-availability assumptions. All regressions use a common sample excluding twelve-month signal windows spanning commitment; $Post_{iF} = 1$ when commitment precedes the window. A positive β indicates that unexpected steepening predicts greater emissions improvement relative to the benchmark, measured in log points per standard deviation of AdjCI. Standard errors are clustered by issuer and target fiscal year.

5.3 Customer Order Flow and Subsequent Price Adjustment

Using the bond-hour measures in [Section 4](#), I estimate

$$\begin{aligned} Y_{bid\ell}^{(\tau)} = & \beta_0 Post_{id} Maturity_{bi} + \beta_1 Flow_{bid\ell} + \beta_2 Flow_{bid\ell} Maturity_{bi} \\ & + \beta_3 Post_{id} Flow_{bid\ell} + \beta_4 Post_{id} Flow_{bid\ell} Maturity_{bi} \\ & + \Lambda' C_{bid\ell} + \mu_b + \alpha_{id\ell} + u_{bid\ell}^{(\tau)}. \end{aligned} \quad (35)$$

$Flow_{bid\ell}$ is net customer sell pressure, $Post_{id}$ is the post-commitment indicator on trading date d , and $Y_{bid\ell}^{(\tau)}$ is the subsequent cumulative yield change in basis points. The regression includes bond and issuer-date-hour fixed effects. $C_{bid\ell}$ contains the trading-control levels and their interactions with $Post_{id}$, $Maturity_{bi}$, and their product.

The coefficient β_4 measures the post-commitment change in the maturity gradient of the order-flow–yield relation. The gradient is β_2 before commitment and $\beta_2 + \beta_4$ afterward. Standard errors are clustered by issuer and calendar date.

5.4 Target Validation and Repricing across Maturities

I use first public SBTi target validation to examine repricing across maturities around an external assessment of the target. Each validated issuer is compared with already committed issuers validated 14–56 calendar days later, provided their validation falls beyond the outcome window.

Day zero is the first trading day on or after the public validation date. Daily Treasury-matched spreads are constructed separately from median customer-buy and customer-sell yields. For each side, I difference the last available daily spreads in windows $[-10, -1]$ and $[0, h - 1]$, where $h \in \{1, 5\}$, averaging the changes when both sides are available. I estimate

$$\Delta Spread_{bis}^{(h)} = \beta_h(Treated_{is} \times Maturity_{bis}/10) + \phi_{is} + \kappa_s Maturity_{bis}/10 + \varepsilon_{bis}^{(h)}. \quad (36)$$

$Maturity_{bis}$ is remaining maturity on day zero, in years and capped at thirty. Issuer-by-stack effects, ϕ_{is} , absorb issuer-specific level changes, while κ_s allows a separate maturity slope in each stack. The coefficient β_h measures the treated-control difference in spread changes per ten additional years of maturity. A placebo applies the same specification to changes from $[-20, -11]$ to $[-10, -1]$. Standard errors are clustered by issuer and validation-event date.

6 Empirical Results

6.1 Summary Statistics

Table 1 reports summary statistics for bond and firm characteristics and customer transactions. The bond sample comprises 73,293 bond-month observations on 1,802 bonds issued by 151 firms. Maturity at commitment has a median of 7.26 years, with the 25th and 75th percentiles at 3.87 and 18.42 years, respectively. The empirical analysis exploits maturity differences across bonds issued by the same firm to examine changes in its credit curve following commitment.

[Table 1]

Credit spreads also exhibit considerable dispersion, with the 25th and 75th percentiles at 61.68 and 143.14 basis points, respectively. The specifications comparing bonds across maturities include bond and issuer-by-calendar-month fixed effects, absorbing time-invariant bond characteristics and issuer-wide monthly conditions. The

maturity response is therefore estimated from changes in relative spreads within the same issuer.

The trading data include both customer purchases and sales, which are aggregated into net customer sell pressure. Customer trade size is strongly right-skewed: the median par amount is \$0.02 million, compared with a mean of \$0.39 million. [Appendix C](#) describes the TRACE cleaning and trade-classification procedures.

Table 2 summarizes commitment timing and within-issuer maturity coverage. First public commitments occur in 2021 and 2022 for 60.26% of firms. The median number of bonds per issuer-month is eight, and the median maturity range is 23.95 years. This variation supports comparisons across economically distinct maturities within the same issuer.

[\[Table 2\]](#)

Table 3 reports average credit spreads before and after commitment, using the same bonds in each maturity group. Spreads decline across all reported groups, with a larger decline for 3–5-year bonds (34.51 basis points) than for 25–30-year bonds (9.08 basis points). The long-minus-short spread differential therefore widens from 21.01 to 46.44 basis points.

[\[Table 3\]](#)

Figure 1 illustrates this pattern using the mean spreads of these two maturity groups. These unconditional means provide descriptive context for the within-issuer regression analysis.

[\[Figure 1\]](#)

6.2 Correlations among Main Variables

Table 4 reports pairwise Pearson correlations among the main variables. Credit spreads are positively correlated with the rating score, below-investment-grade status, and WRDS bid–ask spread, with correlations of 0.54, 0.51, and 0.47, respectively. Higher

rating scores indicate weaker ratings. Credit spreads are negatively correlated with firm size and profitability, at -0.13 and -0.26 , respectively, and positively correlated with leverage, at 0.12 . These patterns are consistent with familiar differences in credit risk and liquidity across corporate bonds.

[Table 4]

Maturity at commitment is positively correlated with credit spreads and bid–ask spreads, at 0.22 and 0.32 , respectively, and negatively correlated with the rating score, at -0.14 . These pooled correlations do not identify repricing after commitment. Maturity at commitment is mechanically linked to current remaining maturity, with a correlation of 0.99 . I hold maturity at commitment fixed throughout the event window so that the exposure measure does not change as bonds age.

6.3 Green Commitments and Credit Spreads across Maturities

Table 5 examines whether the average level and maturity structure of issuer credit spreads change after a green commitment. Columns (1)–(3) show estimated average spread declines of approximately 2.74 to 3.71 basis points in the main sample as bond and firm characteristics are progressively included. The estimates are imprecise and small relative to the cross-sectional variation in credit spreads. The results therefore do not provide statistically significant evidence of an average repricing of the issuer’s outstanding bonds after commitment.

[Table 5]

Columns (4)–(6) compare relatively long- and short-maturity bonds issued by the same firm. A bond is classified as long maturity if its remaining maturity at commitment exceeds the issuer-specific median; the comparison group includes bonds at or below the median. The coefficient measures the postcommitment change in the credit-spread differential between the issuer’s long- and short-maturity bonds. Issue fixed effects absorb persistent differences across bonds, while issuer-by-calendar-month fixed effects absorb

information and market conditions shared by bonds of the same issuer in a given month. The estimates therefore come from changes in relative spreads within the issuer.

In Panel A, the long–short credit-spread differential increases by approximately 5.18 to 8.23 basis points after commitment. The estimate is 5.21 basis points in the baseline specification and 5.18 basis points after adding bond amount outstanding and rating, increasing to 8.23 basis points when duration is included. The positive relationship is present across specifications, although its magnitude is sensitive to the inclusion of duration. The result indicates that credit-spread changes are more positive for longer-maturity bonds than for shorter-maturity bonds, while the estimated change in the issuer’s average spread is not statistically significant.

Panel B restricts the sample to bonds observed throughout the event window. The corresponding estimates range from approximately 9.83 to 11.65 basis points. The balanced-sample estimates are somewhat larger than those in Panel A but imply the same economic pattern. Thus, the persistence of the result in the balanced sample reduces concern that the change in the long–short credit-spread differential is explained solely by changes in which bonds are observed before and after commitment.

Column (7) replaces the long-maturity indicator with maturity at commitment measured in ten-year units. In Panel A, the postcommitment change in credit spreads is 4.64 basis points more positive for each additional ten years of maturity. The corresponding estimate in the balanced sample is 7.54 basis points. Hence, for two bonds issued by the same firm with a twenty-year maturity difference, the implied difference in postcommitment credit-spread changes is approximately 9.29 basis points in the main sample and 15.07 basis points in the balanced sample. The result therefore does not depend on dividing bonds at the issuer-specific median.

Appendix Table [D1](#) shows evidence of lower credit spreads for shorter-maturity bonds in the main sample after controls are included, while changes for longer-maturity bonds are not statistically significant. One possible interpretation, consistent with the model, is that favorable information about transition capacity lowers expected implementation costs. Under the model’s conditions, the resulting revision in repayment prospects can reduce annualized credit spreads more for shorter-maturity bonds.

Figure 2 traces the evolution of these pricing differences around the commitment in the main sample. Panel A reports changes in the credit-spread maturity gradient per ten years of maturity, relative to months -6 to -1 . The estimates during the precommitment periods are not statistically significant, and the figure shows no clear differential precommitment trend. After commitment, the maturity gradient increases by approximately 2.83 basis points in the first six months, 4.24 basis points during months 7 through 12, and 4.64 basis points during months 13 through 18, before moderating to approximately 4.11 basis points during months 19 through 24.

Panel B reports the corresponding dynamics in the average credit spread. The estimates are less precise, and none of the estimated event coefficients is statistically significant. The figure therefore reinforces the distinction observed in the table: a change in the maturity structure of credit spreads is statistically detectable, while a change in the average spread is not.

[Figure 2]

The results show that credit-spread changes differ across maturities. Average spread changes are not statistically significant, whereas changes are more positive for longer-maturity bonds. This distinction is economically important because the theoretical model in Section 3 distinguishes cumulative exposure to transition consequences from its effect on annualized credit spreads. The evidence is therefore consistent with the model's conditional maturity prediction.

6.4 Green Commitments and Offering Spreads across Maturities

Table 5 shows that the postcommitment change in credit spreads differs across the maturities of bonds already outstanding. Secondary-market prices, however, do not show whether the same maturity pattern affects the terms at which firms raise new debt. Table 6 examines whether postcommitment changes in offering spreads on newly issued bonds are more positive at longer maturities for treated issuers relative to later-committing issuers. Offering spreads measure the yield premium over the benchmark U.S. Treasury at issuance, as reported in FISD.

Each commitment event is compared with issuers that make their own first commitment 13 to 24 months later. This stacked design forms a separate comparison sample around each treated commitment, using the same calendar months for the treated issuer and its comparison issuers. The stacked sample covers the 12 months before and after the treated issuer’s commitment, excluding the commitment month. Here, *Post* equals one for the 12 months after the treated issuer’s commitment and zero for the 12 months before it.

The coefficient on $Treated \times Post \times (\text{Maturity at issuance}/10)$ measures whether the postcommitment change in offering spreads increases more with maturity at issuance for the treated issuer than for the later-committing comparison issuers. Issuer-by-stack fixed effects absorb persistent issuer differences within each comparison, while stack-by-calendar-month fixed effects absorb market conditions shared by issuers in the same comparison and calendar month.

[Table 6]

Column (1) shows that the postcommitment change in offering spreads is 41.66 basis points more positive for each additional ten years of maturity at issuance, relative to the later-committing comparison group. Column (2) gives a similar estimate of 41.31 basis points after adding log offering amount and callable status. Column (3) gives an estimate of 40.57 basis points after additionally including firm size, leverage, cash/assets, ROA, market-to-book, and capital expenditures/assets. These firm characteristics use the latest accounting observation available on or before the offering date. All three estimates are statistically significant at the 1% level, with standard errors clustered by issuer and calendar month.

The comparison group consists of issuers that also enter the same commitment framework, but do so after the treated issuer’s event window. This choice reduces reliance on comparisons between firms that choose to commit and firms that never do, which may differ systematically in transition plans, credit quality, and access to financing. The 13-to-24-month restriction keeps the comparison issuers’ own commitments outside the event window while limiting the distance between commitment dates.

This design has three advantages. It compares issuance over the same calendar months, keeps comparison issuers uncommitted throughout the event window, and gives each treated event its own comparison group. The estimate therefore reflects differences in maturity-related spread changes between issuers committing at the treated date and issuers committing later. This comparison is informative to the extent that the groups would have experienced similar maturity-related spread changes without commitment and that later commitments were not already reflected in issuance prices.

The estimates imply economically meaningful differences across maturities. Based on the specification with firm characteristics, the postcommitment change in the offering spread is approximately 61 basis points greater for a 20-year bond than for a 5-year bond, relative to the later-committing comparison group. The coefficient on $Treated \times Post$ is included in the regression but not reported because the table focuses on the maturity-dependent component. The reported estimates therefore do not establish a common increase in offering spreads for all newly issued bonds. Offering-spread changes are more positive at longer maturities for treated issuers relative to comparison issuers. A similar maturity pattern therefore appears in the pricing of newly issued debt.

6.5 The Information Content of the Credit Curve

Table 5 shows that long-maturity credit spreads rise relative to short-maturity spreads after commitment, although the average spread change is not statistically significant. Table 7 asks whether adjusted changes in this maturity slope contain information about future emissions improvement beyond what observable firm and credit-market characteristics predict.

For each issuer-month, I estimate the change in the credit-spread maturity slope and subtract its benchmark prediction. This prediction comes from a model fitted only to earlier calendar years, using the lagged slope, bond characteristics, and contemporaneous credit-market conditions. I weight the resulting forecast error by its estimated reliability to construct AdjCI, reducing the influence of imprecisely estimated slope changes. Higher

AdjCI therefore represents a stronger signal of steepening, or less flattening, relative to this benchmark.

Future emissions improvement is measured as $\log(1 + E_F) - \log(1 + E_{F+1})$. The dependent variable is this improvement minus its out-of-sample benchmark forecast, which I call the emissions-improvement surprise. The benchmark excludes AdjCI and uses available emissions history, accounting characteristics, credit conditions, and commitment status. The regressions also control for firm characteristics, Post, the log of one plus average emissions over the latest three available consecutive fiscal years, and issuer and target-fiscal-year fixed effects. The coefficient on $AdjCI_{iF}^{(h)}$ therefore measures whether the credit-spread signal predicts emissions improvement above the benchmark forecast, conditional on these controls.

Both forecasting models are estimated recursively. To account for reporting delays, Panel A treats annual emissions as available on June 30 of the calendar year following the emissions period end; Panel B uses October 31.¹³ A historical emissions improvement enters the training sample only when both annual observations are available at the forecast origin under the relevant timing assumption.

Columns (1)–(4) aggregate AdjCI over the most recent 1, 3, 6, and 12 months, ending in the last complete calendar month on or before fiscal-year-end. These are signal-aggregation windows; all columns predict the same subsequent fiscal-year emissions improvement. Signals are standardized using pre-commitment observations. All columns and panels use the same 522 issuer-year observations from 122 issuers. Observations whose full twelve-month signal window crosses the commitment date are excluded. Post equals one when commitment precedes that window and zero when it follows it. Each panel reports separate regressions for Scope 1 and Scope 1 plus location-based Scope 2 emissions.

[Table 7]

¹³The June assumption is consistent with the portfolio-formation convention in Duan et al. (2025), which uses emissions for fiscal years ending in the previous calendar year. The October assumption follows the alternative timing examined in the robustness analysis of Zhang (2025), whose main analysis uses observed release dates. Verified historical release dates are not available in the data used here. These assumptions account for reporting lags, but the Trucost values remain from the current data snapshot; they do not remove potential look-ahead arising from subsequent data revisions.

The one-month coefficients are not statistically significant for either emissions measure. Under the June availability assumption, a one-standard-deviation increase in six-month AdjCI is associated with an emissions-improvement surprise that is 0.056 log points higher for Scope 1 and 0.052 log points higher for Scope 1+2. With twelve-month aggregation, the corresponding estimates are 0.049 and 0.047 log points. The six- and twelve-month coefficients are positive and statistically significant under both availability assumptions. The predictive relation is thus most apparent when adjusted slope changes are accumulated over several months.

Economically, the positive coefficients link stronger signals of steepening relative to the slope benchmark to greater subsequent emissions improvement relative to the emissions benchmark. One interpretation is that investors anticipate the financial costs of delivering those improvements. Transition investment requires resources, while execution risk creates uncertainty about future cash flows and debt-servicing capacity. Their effects on the credit-spread curve depend on repayment exposure across maturities and its conversion into annualized spreads, as in Section 3. Stronger expected emissions improvement can coexist with a steeper credit-spread curve, but the predictive regressions do not identify the mechanism underlying this relation. Similar results for Scope 1 and Scope 1+2 show that the predictive relation is present for direct emissions as well as for the combined direct and purchased-energy measure.

6.6 Order Flow and Bond-Yield Changes across Bond Maturities

The preceding results establish two related findings: credit spreads reprice differently across maturities after commitment, and unexpected credit-curve movements predict subsequent emissions performance. Table 8 examines the trading process associated with these findings. It tests whether customer selling is followed by larger changes in bond yields for longer-maturity bonds after commitment.

The dependent variable in this table is the subsequent change in a bond's yield, measured in basis points. It is distinct from the Treasury-matched credit spread used in Table 5. Customer sell pressure is the volume-weighted difference between customer

sales and purchases, scaled by total customer trading volume. Positive values indicate net customer selling.

[Table 8]

Panel A relates customer sell pressure during the order-flow hour to the subsequent change in bond yield over the next hour, the next observed trading day, and the fifth observed trading day. All three columns use the same common sample of origin bond-hours. The specifications include bond fixed effects and issuer–date–hour fixed effects, together with trading controls and their interactions with commitment status, maturity, and their product.

The coefficient of interest is the interaction among post-commitment status, customer sell pressure, and maturity at commitment measured in ten-year units. It measures the post-minus-pre change in the maturity gradient of the relation between customer selling and the subsequent change in bond yield. Bond fixed effects absorb persistent differences across securities, while issuer–date–hour fixed effects absorb conditions shared by an issuer’s bonds within the same trading interval.

Panel A reports positive and statistically significant post-minus-pre changes at all three horizons. For bonds with ten additional years of maturity at commitment, the maturity gradient increases by 2.08 basis points over the next hour, 1.88 basis points by the next observed trading day, and 2.29 basis points by the fifth observed trading day. The implied post-commitment maturity gradients are 2.65, 2.56, and 2.78 basis points, respectively, and are statistically significant at the 1% level.

These estimates indicate that, after commitment, customer selling is associated with a more positive subsequent yield response at longer maturities. Because all three columns use the same common sample, the estimates are directly comparable across horizons. Their ordering does not by itself establish a persistent price effect.

Panel B reports a future-order-flow timing placebo. The interaction between future sell pressure, post-commitment status, and maturity is 0.16 basis points, with $t = 0.62$ and $p = 0.538$. The absence of a comparable future-flow interaction is consistent with the main relation being linked to information in current order flow.

6.7 External Target Validation and Credit-Curve Repricing

I use the first public SBTi target validation to examine whether credit-spread responses to public information about the issuer’s transition target differ across maturities. Target validation provides an external assessment of the submitted target with a clearly identified public release. Table 9 tests whether spread changes around validation are more positive for longer-maturity bonds relative to the comparison issuers.

Each validated issuer is compared with issuers that have already committed but receive their own first validation later. The initial risk set includes issuers scheduled for validation 14 to 56 calendar days after the treated event. For each outcome horizon, a control issuer is retained only if its own validation occurs after the end of that horizon. This prevents the control group from being exposed to its own validation during the relevant measurement window.

For each bond, the pre-validation spread is the last same-side Treasury-matched spread during the ten trading days before validation. The post-validation spread is the corresponding last observation within the one-trading-day or five-trading-day horizon. Same-side observations keep the spread measurement comparable before and after validation. The stacked regressions include issuer-by-stack fixed effects and stack-specific maturity slopes.

[Table 9]

Panel A shows that relative spreads increase more for longer-maturity bonds after validation. Over the first trading day, an additional ten years of remaining maturity is associated with 2.32 basis points of additional spread widening relative to later-validation control issuers. The corresponding estimate over five trading days is 2.14 basis points. The similar estimates across these horizons indicate that the public validation is followed by a maturity-dependent repricing of credit spreads.

Panel B finds no comparable maturity response before validation. The placebo estimate is negative and statistically insignificant. The post-validation pattern therefore does not appear to be a continuation of a similar positive movement that was already underway.

Overall, target validation is followed by a maturity-dependent change in Treasury-matched credit spreads. The result provides external evidence that public information about transition prospects is incorporated more strongly into longer-horizon credit claims.

7 Robustness Checks

This section examines whether the maturity-differentiated credit-spread response is sensitive to the event window, the COVID period, extreme credit spreads, the availability of bonds across the maturity structure, or the definition of long maturity. The baseline results indicate that green commitments are followed by an increase in the spread difference between an issuer’s longer- and shorter-maturity bonds.

[\[Table 10\]](#)

Table 10 reports the robustness results. Column (1) presents the reference estimate of 8.23 basis points using the ± 24 -month event window, reproducing Panel A, column (6), of Table 5. Columns (2) and (3) use ± 12 -month and ± 36 -month windows and produce estimates of 5.56 and 9.91 basis points, respectively. Column (4) excludes March–December 2020 from the ± 36 -month sample and produces an estimate of 11.52 basis points.

Panel B applies alternative restrictions to the ± 36 -month sample. Trimming observations at or beyond the 1st and 99th percentiles of the credit-spread distribution produces an estimate of 7.39 basis points. Requiring at least three bonds and a ten-year maturity span per issuer-month reduces the sample to 104 issuers but yields an estimate of 9.75 basis points. Defining long maturity using the issuer-specific upper maturity tercile produces an estimate of 9.96 basis points.

Across the specifications, the estimated long–short spread response ranges from 5.56 to 11.52 basis points and remains statistically significant at the 1% level. The result is therefore robust to alternative event windows, sample restrictions, and maturity definitions.

8 Conclusion

The central finding of the paper is that green commitments are associated with changes in relative credit pricing across maturities. Average spread changes are not statistically significant, but longer-maturity bonds widen relative to shorter-maturity bonds after commitment. Offering-spread changes on newly issued debt are also more positive at longer maturities for committing issuers relative to later-committing issuers, so a similar maturity differential appears in secondary-market prices and new borrowing costs. Unexpected credit-curve movements also predict subsequent emissions improvement beyond the public information captured by the forecasting model. Consistent with an information channel, the postcommitment change in the yield response to customer sell pressure is more positive at longer maturities, and public target validation is associated with more positive credit-spread changes at longer maturities relative to comparison issuers. Together, these findings are consistent with transition-related information affecting relative pricing across bond maturities.

These findings also motivate a different interpretation of voluntary green commitments in credit markets. In the model, a commitment need not mark the first arrival of transition information. Such information may already be reflected in bond prices but become more relevant for claims exposed over the implementation horizon. Under the model's conditions, an incomplete public commitment can therefore change the pricing relevance of information across maturities.

The findings also have potential implications for corporate governance. The credibility of a green commitment depends on whether the firm's operating capacity, investment resources, and financing arrangements can support implementation. Longer-maturity creditors remain exposed over the implementation horizon and may therefore have stronger incentives to scrutinize these capabilities. If unfavorable assessments lead to less favorable financing terms, such scrutiny may make unsupported commitments more costly and strengthen creditor monitoring of long-horizon corporate policies. This governance implication is not directly tested in the paper. Green

commitments should therefore be evaluated together with capital budgeting, financing capacity, and debt-maturity policy.

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Table 1: Summary Statistics

Variable	N	Mean	SD	P1	P25	Median	P75
Panel A. Bond characteristics							
Treasury-matched credit spread, bps	73,293	115.00	84.17	5.59	61.68	96.86	143.14
Maturity at commitment, years	73,293	10.91	8.86	0.64	3.87	7.26	18.42
Long-maturity bond	73,293	0.49	0.50	0.00	0.00	0.00	1.00
Remaining maturity, years	73,293	10.91	8.85	0.58	3.79	7.26	18.33
Log bond amount outstanding	73,293	13.30	0.87	9.98	12.90	13.38	13.82
Credit rating score	73,293	7.15	2.49	1.00	6.00	8.00	9.00
Below-investment-grade bond	73,293	0.07	0.25	0.00	0.00	0.00	0.00
Panel B. Issuer-year accounting characteristics							
Firm size	711	10.38	1.19	8.29	9.50	10.25	11.07
Leverage	711	0.35	0.16	0.02	0.24	0.34	0.45
Cash/assets	711	0.13	0.12	0.00	0.04	0.09	0.17
ROA	711	0.07	0.06	-0.10	0.03	0.06	0.10
Market-to-book assets	711	2.71	1.81	0.94	1.37	2.13	3.30
Capital expenditures/assets	711	0.03	0.02	0.00	0.01	0.02	0.04
Panel C. Customer transactions matched to the pricing sample							
Customer sell indicator	4,616,329	0.44	0.50	0.00	0.00	0.00	1.00
Customer trade par amount, USD million	4,616,329	0.39	1.76	0.00	0.01	0.02	0.10
Transaction price per \$100 par	4,616,329	100.44	11.04	70.12	95.31	100.05	105.90
Transaction yield, percent	4,616,329	3.63	1.85	0.25	2.13	3.89	5.04

Notes: Panel A summarizes 73,293 bond-month observations on 1,802 bonds issued by 151 firms over event months, excluding the commitment month. Panel B reports distinct matched issuer-year accounting observations. Long maturity equals one for bonds above the issuer-specific median maturity at commitment. Higher rating scores indicate weaker ratings. Bond amounts are measured in USD thousands before taking logarithms. Variable definitions follow Section 4. Panel C reports cleaned customer transactions matched to the pricing sample, before the additional restrictions used in the bond-hour regressions. Transactions cover June 3, 2013 through March 31, 2025. Trade amounts are in USD millions, and transaction variables are not winsorized.

[Return to text.](#)

Table 2: Commitment Timing and Bond Maturities

<i>Panel A. Commitments by year</i>								
Year	Issuers	Share, pct	Year	Issuers	Share, pct			
2015	1	0.66	2020	19	12.58			
2016	1	0.66	2021	56	37.09			
2017	0	0.00	2022	35	23.18			
2018	1	0.66	2023	17	11.26			
2019	7	4.64	2024	14	9.27			
Total	151	100.00						
<i>Panel B. Bonds per issuer-month and maturity range</i>								
Variable	Issuer-months	Mean	SD	Min	P25	Median	P75	Max
Number of bonds	6,750	10.86	9.89	2	4	8	13	63
Maturity range, years	6,750	18.71	9.44	0.58	7.62	23.95	26.46	29.26

Notes: Panel A reports the year of first public commitment for the 151 firms in the pricing sample. Panel B summarizes 6,750 issuer-months. Bond count is the number of distinct issues within an issuer-month. Maturity range is the difference between the maximum and minimum maturity at commitment within an issuer-month. Maturity is measured in years and winsorized at the 1st and 99th percentiles before calculating the range.

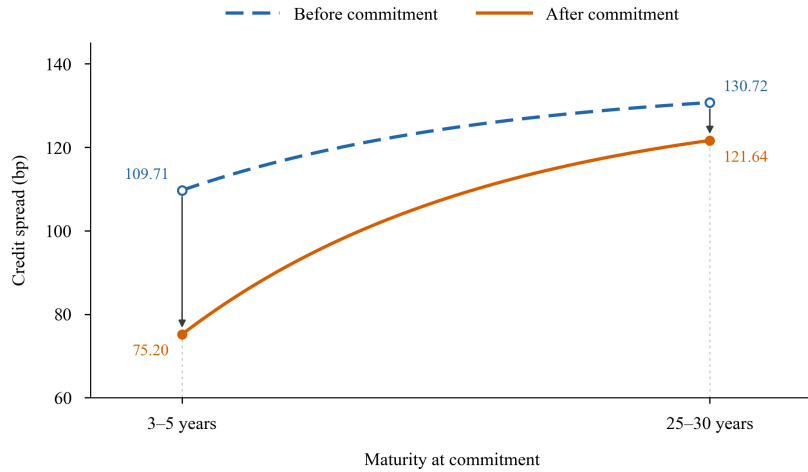
[Return to text.](#)

Table 3: Credit Spreads Before and After Commitment by Maturity

Maturity (years)	Before	After	After – Before
3–5	109.71	75.20	–34.51
5–10	128.98	107.74	–21.24
10–15	171.13	145.05	–26.08
15–20	145.99	130.68	–15.30
20–25	149.71	131.32	–18.39
25–30	130.72	121.64	–9.08

Notes: Spreads are winsorized, Treasury-matched credit spreads in basis points. Maturity is fixed at commitment; bins exclude the lower endpoint and include the upper endpoint. Before and After cover event months $[-24, -1]$ and $[1, 24]$. I first average available monthly spreads within each bond and window, then equally across bonds in each maturity group, using the same bonds before and after. Changes equal After minus Before, calculated from unrounded means.

[Return to text](#)

Figure 1: Illustration of Credit-Curve Steepening

Notes: Markers show observed mean spreads for the 3–5-year and 25–30-year maturity groups. Connecting curves are illustrative and are not fitted to the intermediate maturity groups.

[Return to text](#)

Table 4: Pairwise Correlations

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) Credit spread	1.00																
(2) Monthly return	-0.02	1.00															
(3) Maturity at commitment	0.22	-0.04	1.00														
(4) Long maturity	0.29	-0.03	0.75	1.00													
(5) Remaining maturity	0.24	-0.03	0.99	0.74	1.00												
(6) Duration	0.21	-0.03	0.97	0.75	0.98	1.00											
(7) Log bond amount	-0.22	-0.01	0.06	0.04	0.05	0.07	1.00										
(8) Rating score	0.54	0.03	-0.14	-0.03	-0.14	-0.17	-0.24	1.00									
(9) Below IG	0.51	0.04	-0.13	-0.02	-0.13	-0.15	-0.09	0.51	1.00								
(10) Trading volume	0.06	0.01	0.01	0.03	0.02	0.03	0.52	-0.04	0.09	1.00							
(11) WRDS bid-ask spread	0.47	0.02	0.32	0.29	0.34	0.33	-0.18	0.10	0.14	-0.04	1.00						
(12) Firm size	-0.13	0.01	0.06	0.03	0.06	0.05	0.30	-0.45	-0.06	0.23	0.03	1.00					
(13) Leverage	0.12	0.00	0.00	0.01	0.00	-0.01	0.02	0.23	0.07	0.04	0.01	-0.20	1.00				
(14) Cash/assets	-0.13	0.00	-0.04	-0.01	-0.05	-0.04	0.26	-0.32	0.02	0.15	-0.03	0.11	-0.14	1.00			
(15) ROA	-0.26	-0.01	0.06	0.01	0.05	0.07	0.16	-0.41	-0.17	0.05	-0.03	-0.04	0.24	0.28	1.00		
(16) Market-to-book	-0.28	-0.02	0.03	0.01	0.02	0.04	0.17	-0.36	-0.12	0.06	-0.08	-0.14	0.27	0.38	0.75	1.00	
(17) Capex/assets	0.11	0.03	0.04	0.00	0.05	0.04	-0.01	0.02	0.03	0.06	0.05	0.09	0.24	-0.10	0.03	-0.01	1.00

Notes: Pearson correlations use pairwise nonmissing observations from the pricing sample of 151 firms reported in Panel A of Table 1. Pairwise sample sizes range from 68,733 to 73,293. All correlations are calculated at the bond-month level, with accounting variables carried forward to matched observations.

[Return to text.](#)

Table 5: Green Commitments and Credit Spreads across Maturities

Dependent variable	Credit spread (basis points)						
	Average credit-spread change			Change in long-short credit-spread differential		Change in credit-spread maturity gradient (per 10 years)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel A. Main unbalanced sample</i>							
Post commitment	-2.74 (-0.74)	-3.41 (-0.95)	-3.71 (-1.06)				
Post commitment $\times$ Long-maturity bond				5.21** (1.98)	5.18* (1.95)	8.23*** (3.43)	
Post commitment $\times$ (Maturity at commitment / 10)							4.64*** (3.43)
Observations	73,293	73,293	73,293	73,293	73,293	73,293	73,293
Issuers	151	151	151	151	151	151	151
Bonds	1,802	1,802	1,802	1,802	1,802	1,802	1,802
Within R^2	0.000	0.073	0.086	0.003	0.004	0.040	0.040
<i>Panel B. Balanced sample</i>							
Post commitment	-2.37 (-0.51)	-2.46 (-0.56)	-3.15 (-0.71)				
Post commitment $\times$ Long-maturity bond				10.07*** (4.29)	9.83*** (4.05)	11.65*** (4.43)	
Post commitment $\times$ (Maturity at commitment / 10)							7.54*** (4.45)
Observations	39,792	39,792	39,792	39,792	39,792	39,792	39,792
Issuers	103	103	103	103	103	103	103
Bonds	829	829	829	829	829	829	829
Within R^2	0.000	0.096	0.109	0.013	0.015	0.049	0.051
Issue fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar-month fixed effects	Yes	Yes	Yes	No	No	No	No
Issuer-month fixed effects	No	No	No	Yes	Yes	Yes	Yes
Bond characteristics: log amount outstanding and rating	No	Yes	Yes	No	Yes	Yes	Yes
Duration	No	Yes	Yes	No	No	Yes	Yes
Firm characteristics	No	No	Yes	Absorbed	Absorbed	Absorbed	Absorbed

Notes: Credit spread is the corporate bond yield minus the maturity-matched Treasury yield, in basis points. The main sample corresponds to Panel A of Table 1. The window spans 24 months before and after commitment, excluding month 0. Panel A requires complete bond and firm characteristics, observations before and after commitment for each bond, and at least two distinct maturities per issuer-month. Panel B additionally requires each bond to be observed in all 48 event months. All columns within a panel use the same observations. Long-maturity bonds are above the issuer-specific median maturity at commitment; short-maturity bonds are at or below it. The median is calculated using distinct eligible bonds separately in each panel. Maturity is measured in years; column (7) scales it by ten. Controls follow Section 4. Parentheses contain t -statistics based on two-way clustering by issuer and calendar month. Stars use two-sided asymptotic normal p -values: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[Return to text.](#)

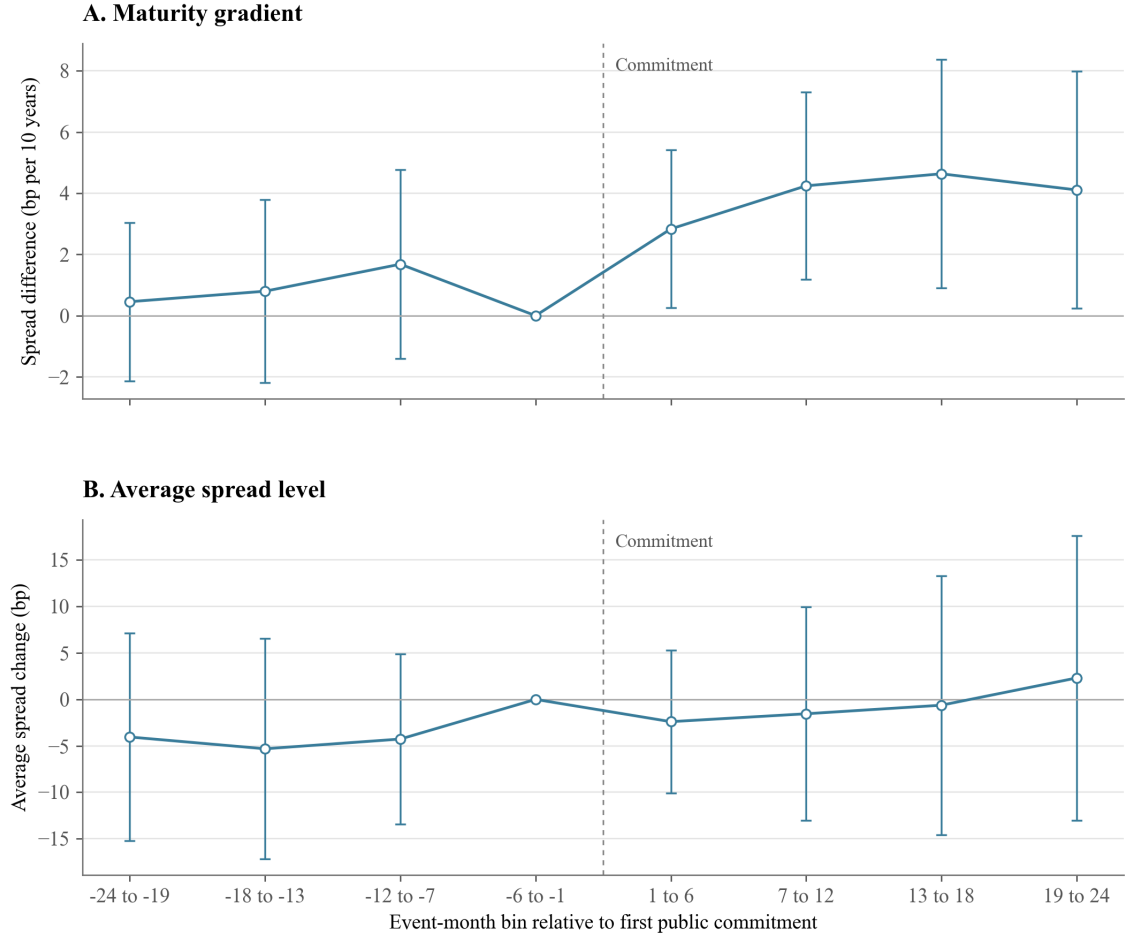


Figure 2: Event-Time Dynamics of Credit-Spread Levels and the Maturity Gradient

Notes: The figure uses the main unbalanced sample of 151 issuers. Estimates are reported in six-month intervals relative to $[-6, -1]$; month zero is excluded. Panel A reports changes in the credit-spread maturity gradient per ten additional years of maturity at commitment; Panel B reports average credit-spread changes. Both specifications include issue fixed effects, log amount outstanding, and credit rating, with issuer-month fixed effects in Panel A and calendar-month fixed effects in Panel B. Bars show 95% confidence intervals based on standard errors two-way clustered by issuer and calendar month. Joint tests of the three pre-commitment coefficients yield $p = 0.741$ in Panel A and $p = 0.824$ in Panel B.

[Return to text.](#)

Table 6: Green Commitments and Offering Spreads across Maturities

Dependent variable	Offering spread (basis points)		
	(1)	(2)	(3)
Treated issuer $\times$ Post $\times [(Maturity\ at\ issuance - 10) / 10]$	41.66*** (3.13)	41.31*** (3.27)	40.57*** (3.23)
Lower-order terms	Yes	Yes	Yes
Bond characteristics	No	Yes	Yes
Firm characteristics	No	No	Yes
Issuer-by-stack fixed effects	Yes	Yes	Yes
Stack-by-calendar-month fixed effects	Yes	Yes	Yes
Bond-stack observations	2,047	2,047	1,639
Unique bond issues	466	466	377
Event stacks	41	41	41
Issuers	114	114	95

Notes: Offering spread is the yield spread over the benchmark U.S. Treasury at issuance. Event stacks are constructed using a committing issuer and issuers committing 13–24 months later over a ± 12 -month window, excluding month 0. Post is defined relative to the treated issuer’s commitment. Maturity at issuance is measured in years, centered at ten years, and divided by ten. The reported coefficient measures the treated-minus-comparison difference in the postcommitment change in the offering-spread maturity gradient per ten years. Lower-order terms are included or absorbed by fixed effects.

Bond characteristics are log offering amount and callable status. Firm characteristics are size, leverage, cash/assets, ROA, market-to-book, and capital expenditures/assets, using the latest annual accounting observation whose fiscal year-end is at least six months before issuance. Column (3) uses the smaller sample with nonmissing firm characteristics.

Within each initial stack, weights give equal total weight to the treated and comparison groups, equal weight to issuers within each group, and equal weight to issues within each issuer. These weights are retained after dropping observations with missing regression variables. Event-stack counts include all stacks with retained observations. Parentheses contain t -statistics based on two-way clustering by issuer and calendar month. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

[Return to text.](#)

Table 7: Credit Curve Signals and Unexpected Emissions Improvement

Dependent variable	Emissions-improvement surprise (log points)			
	AdjCI aggregation window			
	1 month	3 months	6 months	12 months
	(1)	(2)	(3)	(4)
<i>Panel A. Emissions assumed available on June 30 of the following year</i>				
Scope 1: AdjCI	0.035	0.046	0.056***	0.049**
	(0.95)	(1.79)	(7.69)	(3.56)
Scope 1+2: AdjCI	0.039	0.052**	0.052***	0.047***
	(1.66)	(2.58)	(6.14)	(4.15)
<i>Panel B. Emissions assumed available on October 31 of the following year</i>				
Scope 1: AdjCI	0.029	0.043	0.055***	0.049**
	(0.88)	(1.84)	(9.00)	(3.55)
Scope 1+2: AdjCI	0.038	0.053**	0.053***	0.049***
	(1.65)	(2.59)	(6.87)	(4.51)
Firm characteristics	Yes	Yes	Yes	Yes
Available three-year average emissions	Yes	Yes	Yes	Yes
Post-commitment indicator	Yes	Yes	Yes	Yes
Issuer fixed effects	Yes	Yes	Yes	Yes
Target-fiscal-year fixed effects	Yes	Yes	Yes	Yes
Observations	522	522	522	522
Issuers	122	122	122	122

Notes: The dependent variable is actual emissions improvement, $\log(1+E_F) - \log(1+E_{F+1})$, minus its out-of-sample benchmark forecast, which excludes AdjCI. Scope 1+2 includes location-based Scope 2 emissions. The columns vary the signal-aggregation window; all predict the same subsequent fiscal-year emissions improvement. AdjCI is standardized using pre-commitment observations. Each reported coefficient comes from a separate regression; all regressions use the same 522 issuer-year observations. Coefficients are in log points per standard deviation of AdjCI. Standard errors are two-way clustered by issuer and target fiscal year; t -statistics are in parentheses. Significance uses a t distribution with six degrees of freedom. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[Return to text.](#)

Table 8: Post-Commitment Order-Flow Price Responses across Maturities

Dependent variable	Subsequent yield change (basis points)		
	Next hour (1)	Next observed trading day (2)	Fifth observed trading day (3)
<i>Panel A. Common sample with trading-control interactions</i>			
Pre-commitment gradient (β_2)	0.58*** (2.82)	0.68*** (3.21)	0.50** (2.39)
Post-minus-pre change (β_4)	2.08*** (6.37)	1.88*** (5.84)	2.29*** (4.87)
Post-commitment gradient ($\beta_2 + \beta_4$)	2.65*** (6.66)	2.56*** (6.68)	2.78*** (5.75)
Bond-hour observations	272,238	272,238	272,238
Issuers	86	86	86
Bonds	822	822	822
Bond fixed effects	Yes	Yes	Yes
Issuer-date-hour fixed effects	Yes	Yes	Yes
Lower-order terms	Yes	Yes	Yes
Trading controls in levels	Yes	Yes	Yes
Trading-control interactions	Yes	Yes	Yes
<i>Panel B. Future-order-flow timing placebo</i>			
Dependent variable	Next-hour yield change (basis points)		
	Future flow from the second subsequent hour (4)	(5)	
Post $\times$ Current sell pressure $\times$ Maturity / 10		2.36*** (5.16)	
Post $\times$ Future sell pressure $\times$ Maturity / 10		0.16 (0.62)	
Future-flow interaction p -value		0.538	
Bond-hour observations		158,770	
Issuers		84	
Bonds		780	
Bond fixed effects	Yes	Yes	
Issuer-date-hour fixed effects	Yes	Yes	
Current- and future-flow lower-order terms	Yes	Yes	
Trading controls in levels	Yes	Yes	
Trading-control interactions	Yes	Yes	

Notes: Panel A uses the same common sample of origin bond-hours in all three horizons. The dependent variable is the subsequent change in bond yield, measured from the last observed yield in the order-flow hour. Column (1) ends at the last observed yield in the next hour; columns (2) and (3) use the last eligible hourly yield on the next and fifth observed trading days, respectively. The latter endpoints occur within 1–7 and 5–30 calendar days.

Customer sell pressure equals customer sales minus purchases in par volume, divided by total customer trading volume. Positive values indicate net selling. Each gradient is per one-unit increase in sell pressure and ten additional years of maturity at commitment. The post-commitment gradient is the sum of the pre-commitment gradient and the post-minus-pre change; its standard error uses their covariance.

Panel B is a timing placebo. Future sell pressure is measured after the next-hour yield endpoint and therefore should not predict that endpoint through the same contemporaneous information channel. The placebo specification retains current sell pressure and includes future flow and all corresponding lower-order terms.

[Return to text.](#)

Table 9: Maturity Responses of Credit Spreads around External Validation

	Change in Treasury-matched credit spread (basis points)	
	1 trading day	5 trading days
	(1)	(2)
<i>Panel A. Post-validation response</i>		
Treated issuer $\times$ (Remaining maturity at validation / 10)	2.32**	2.14*
	(2.10)	(1.80)
Small-sample p	0.043	0.080
Wild-bootstrap p	0.020	0.073
Observations	1,078	1,204
Validation events	42	45
Control issuers	46	48
<i>Panel B. Pre-validation placebo</i>		
Treated issuer $\times$ (Remaining maturity at validation / 10)	-1.82	
	(-1.49)	
Small-sample p	0.143	
Observations	1,307	
Placebo events	49	
Issuer-by-stack fixed effects	Yes	Yes
Stack-specific maturity slopes	Yes	Yes

Notes: In Panel A, the dependent variable is the change in the Treasury-matched credit spread from the last same-side customer trade during trading days $[-10, -1]$ to the last same-side trade within the indicated post-validation horizon. Control issuers have already committed and receive validation after the end of the relevant outcome window. The coefficient measures the treated-minus-control difference in spread changes per ten additional years of remaining maturity, measured at the treated issuer's validation date.

Panel B compares trading days $[-20, -11]$ with $[-10, -1]$. Same-side trades keep spread measurement comparable across windows. All specifications include issuer-by-stack fixed effects and stack-specific maturity slopes.

[Return to text.](#)

Table 10: Robustness of the Maturity-Differentiated Credit-Spread Response*Panel A. Alternative event windows and exclusion of the COVID period*

	Treasury-matched credit spread (basis points)			
	± 24 months	± 12 months	± 36 months	Exclude COVID
	(1)	(2)	(3)	(4)
$Post_{it} \times Long_b$	8.23*** (3.43)	5.56*** (2.79)	9.91*** (3.97)	11.52*** (4.75)
Event window (months)	± 24	± 12	± 36	± 36
Observations	73,293	40,151	100,692	86,249
Issuers	151	151	151	150
Bonds	1,802	1,802	1,803	1,746
Issue fixed effects	Yes	Yes	Yes	Yes
Issuer-month fixed effects	Yes	Yes	Yes	Yes
Bond controls	Yes	Yes	Yes	Yes

Panel B. Alternative sample restrictions and maturity definition

	Treasury-matched credit spread (basis points)		
	Trim spread tails	≥ 3 bonds and ≥ 10 -year span	Upper maturity tercile
	(5)	(6)	(7)
$Post_{it} \times Long_b$	7.39*** (3.34)	9.75*** (3.70)	9.96*** (4.37)
Event window (months)	± 36	± 36	± 36
Observations	98,016	90,113	100,692
Issuers	151	104	151
Bonds	1,798	1,613	1,803
Issue fixed effects	Yes	Yes	Yes
Issuer-month fixed effects	Yes	Yes	Yes
Bond controls	Yes	Yes	Yes

Notes: Column (1) reproduces Panel A, column (6), of Table 5. Columns (2) and (3) use ± 12 - and ± 36 -month windows; columns (4)–(7) start from the ± 36 -month sample. The commitment month is excluded throughout. Column (4) excludes March–December 2020; column (5) trims observations at or beyond the 1st and 99th spread percentiles; column (6) requires at least three bonds and a ten-year maturity span in every retained issuer-month.

$Post_{it}$ equals one after commitment. $Long_b$ identifies bonds above the issuer-specific median maturity at commitment, except in column (7), which uses maturity percentile ranks above two-thirds. Groups are formed from distinct retained bonds in each specification and held fixed over time. The issuer universe consists of the 151 firms in the main sample. Each bond must be observed before and after commitment, and each retained issuer-month must contain at least two distinct maturities. Bond controls are log amount outstanding, rating, and duration.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[Return to text](#)

Appendix A Variable Construction

Table A1: Variable Definitions

Variable	Definition
<i>Credit spread</i>	Corporate bond yield minus the linearly interpolated Treasury constant-maturity yield with the same remaining maturity, in basis points. Interpolation uses the 1-, 2-, 3-, 5-, 7-, 10-, 20-, and 30-year Treasury maturities. Bonds with less than one year remaining are matched to the one-year rate. Spreads are not adjusted for embedded call options.
<i>Maturity at commitment</i>	Years from the issuer's first public commitment date to contractual maturity. The measure is fixed over the event window and divided by ten in continuous-maturity specifications.
<i>Long-maturity bond</i>	Indicator equal to one when maturity at commitment exceeds the issuer-specific median among distinct eligible bonds in the relevant estimation sample.
<i>Post</i>	Indicator for the post-commitment period; the commitment month is excluded. In stacked issuance regressions, Post is defined relative to the treated issuer's event. In emissions regressions, it equals one only when commitment precedes the full twelve-month signal window.
<i>Offering spread</i>	Yield spread over the benchmark U.S. Treasury at issuance, as reported in FISD, in basis points.
<i>Maturity at issuance</i>	Years from issuance to contractual maturity. Issuance regressions use $(\text{Maturity at issuance} - 10)/10$.
<i>Bond controls</i>	Log amount outstanding, credit rating score, and duration. Higher rating scores indicate lower credit quality.
<i>Firm characteristics</i>	Firm size, leverage, cash/assets, ROA, market-to-book, capital expenditures/assets, and free cash flow/assets. Free cash flow is operating cash flow minus capital expenditures, scaled by assets.
<i>Issuer credit-curve slope</i>	OLS coefficient on maturity at commitment, measured in ten-year units, from the cross section of an issuer's Treasury-matched bond spreads in a calendar month.
<i>Raw credit-curve innovation</i>	Unexpected monthly change in the issuer credit-curve slope: $RawCI_{it} = \Delta Curve_{it} - \widehat{\Delta Curve_{it}}$ The benchmark is estimated using preceding calendar years.

(continued)

Table A1: Variable Definitions, continued

Variable	Definition
<i>Adjusted credit-curve innovation (AdjCI)</i>	The raw innovation is first multiplied by a reliability weight $\rho_{it} \in [0, 1]$ based on estimated slope precision. For $h \in \{1, 3, 6, 12\}$, $A_{iF}^{(h)} = h^{-1/2} \sum_{j=0}^{h-1} \rho_{i,t(F)-j} \text{RawCI}_{i,t(F)-j},$ where $t(F)$ is the last complete calendar month ending on or before fiscal-year-end. The aggregated signal is standardized using the corresponding pre-commitment observations. Windows crossing commitment are excluded.
<i>Future emissions improvement</i>	Decline in log emissions from fiscal year F to $F + 1$: $I_{iF} = \log(1 + E_{iF}) - \log(1 + E_{i,F+1}).$ Positive values indicate an emissions reduction. Outcomes use Scope 1 and Scope 1 plus location-based Scope 2 emissions.
<i>Emissions-improvement surprise</i>	Actual emissions improvement minus its out-of-sample benchmark forecast, $\text{Surprise}_{iF} = I_{iF} - \hat{I}_{iF}^{\text{Benchmark}}.$
<i>Customer sell pressure</i>	The benchmark excludes AdjCI. Net customer selling at the bond-hour level: $\text{Flow} = \frac{\text{sell volume} - \text{buy volume}}{\text{sell volume} + \text{buy volume}}.$
<i>Subsequent yield change</i>	The measure ranges from -1 to 1, with positive values indicating net selling. Change in bond yield, in basis points, from the last observed yield in the order-flow hour to the next hour, the next observed trading day, or the fifth observed trading day.
<i>Trading controls</i>	Bond-hour measures of customer trade count, total customer volume, mean trade size, price dispersion, large-trade share, interdealer volume share, and dealer report-side imbalance. In the reported order-flow regressions, these controls enter in levels and are interacted with Post, maturity, and Post $\times$ maturity.

(continued)

Table A1: Variable Definitions, continued

Variable	Definition
<i>Target-validation release</i>	First public SBTi Target record after the issuer's initial commitment. The event date is the first market trading day on or after publication. Controls are already committed issuers receiving validation 14–56 calendar days later and outside the relevant outcome window.
<i>Maturity at validation</i>	Years from the treated validation event date to contractual maturity, measured on the same date for treated and control bonds. The regression measure is capped at 30 years and divided by ten.
<i>Validation-event spread change</i>	Change in same-side Treasury-matched credit spreads from the last available observation in trading days $[-10, -1]$ to the last available observation in the post-validation window. The post windows are $[0, 0]$ and $[0, 4]$; the placebo compares $[-20, -11]$ with $[-10, -1]$.

Notes: Continuous bond and accounting controls are winsorized at the 1st and 99th percentiles. Annual accounting observations are assumed available six months after fiscal year-end. Maturity at commitment and the associated long-maturity classification are fixed within each specification.

Appendix B Model Derivations

B.1 Public Beliefs and Burden Moments

For the prior and signal in the main text, Bayes' rule gives

$$f_1(\theta | r) = \frac{f_0(\theta) \exp[-\pi(r - \theta)^2/2]}{\int_0^\infty f_0(t) \exp[-\pi(r - t)^2/2] dt}, \quad \theta > 0. \quad (37)$$

The moments in (7) are finite since $0 \leq B_C^*(\theta) \leq \phi_C \bar{a}^2/2$. Let E_C and Var_C denote moments conditional on $\mathcal{I}_C$. Then

$$\Delta \mathcal{B} = E_0[B_1^* - B_0^*] + \{E_1[B_1^*] - E_0[B_1^*]\}. \quad (38)$$

The first term is positive. With regimes fixed, iterated expectations give $E_0[\Delta \mathcal{B}] = E_0[B_1^* - B_0^*] > 0$; a negative realized change therefore requires a sufficiently favorable information update.

The law of total variance gives

$$E_0[\sigma_1^2] = \sigma_0^2 - \text{Var}_0(E_1[\theta]), \quad (39)$$

$$E_0[Q_1^2] = \text{Var}_0(B_1^*) - \text{Var}_0(E_1[B_1^*]). \quad (40)$$

The second identity holds the burden function at B_1^* ; its first term need not equal Q_0^2 .

B.2 Implementation and Repayment Exposure

Strict convexity follows from $1/\theta + \phi_C > 0$. The first-order condition $a/\theta + \phi_C(a - \bar{a}) = 0$ gives (4) and (5). The action comparisons follow by differentiation, while

$$\partial_{\phi_C} B_C^* = \frac{\bar{a}^2}{2(1 + \phi_C \theta)^2} > 0, \quad \partial_{\phi_C} d_C = \frac{\phi_C \bar{a}^2}{(1 + \phi_C \theta)^3} \geq 0. \quad (41)$$

Integrating $\partial_{\phi_C} d_C$ from ϕ_0 to ϕ_1 establishes $d_1(\theta) > d_0(\theta)$, including when $\phi_0 = 0$.

For $\theta < \theta'$,

$$B_1^*(\theta) - B_1^*(\theta') = \int_{\theta}^{\theta'} d_1(t) dt > \int_{\theta}^{\theta'} d_0(t) dt = B_0^*(\theta) - B_0^*(\theta').$$

Using independent draws from a common nondegenerate distribution,

$$\text{Var}(B_C^*) = \frac{1}{2}E[(B_C^*(\theta) - B_C^*(\theta'))^2]$$

then proves that stronger requirements increase burden dispersion under unchanged beliefs.

Define $\eta_m = h_m(A_m^\circ) + \delta_m(\bar{A}_m - A_m^\circ)$. The first-order resource expansion is

$$X_{mC}^{\text{aff}} = \eta_m + \delta_m[R_C - G_m B_C^*(\theta)] + \delta_m \xi_m. \quad (42)$$

Centering this expression and using the exact public mean yields the local approximation (11). The difference between long- and short-maturity exposure changes factors as $(\delta_L G_L - \delta_S G_S)[d_1(\theta) - d_0(\theta)]$, which is positive under the stated exposure condition.

B.3 Annualized Spreads and the Credit Curve

At fixed references, let $\mu_m^\circ = \eta_m + \delta_m(R^\circ - G_m \mathcal{B}^\circ) > 0$. Differentiating (13) gives

$$dS_m = -\frac{dE_C[X_{mC}]}{T_m \mu_m^\circ} \simeq -\beta_m dR_C + \ell_m d\mathcal{B}_C.$$

This yields (14), with intercept

$$\alpha_m = -\frac{1}{T_m} \log \left(\frac{\mu_m^\circ}{F_m} \right) + \beta_m R^\circ - \ell_m \mathcal{B}^\circ. \quad (43)$$

Under Proposition 1's conditions, multiplying $\ell_S > \ell_L > 0$ by $\Delta \mathcal{B} < 0$ establishes the spread ordering and positive change in K_C .

B.4 Signals, Trading, and Information Acquisition

Suppress subscripts and condition trading moments on public information and observed precision. For $Q > 0$ and $0 < e < 1$, construct

$$s = \tilde{w} + \zeta, \quad \zeta \sim N\left(0, \frac{1-e^2}{e^2}Q^2\right), \quad (44)$$

with independent noise. Gaussian updating gives $z = e^2s$ and $\text{Cov}(\tilde{w}, z) = \text{Var}(z) = e^2Q^2$. The endpoints $e = 0$ and $e = 1$ correspond to no information and full revelation of the proxy.

Conditional expected profit is $q(Hz - \lambda q)$. For $\lambda > 0$, the investor's first-order condition and competitive pricing imply

$$b = \frac{H}{2\lambda}, \quad \lambda = \frac{Hbe^2Q^2}{b^2e^2Q^2 + \sigma_u^2}. \quad (45)$$

Hence $b^2e^2Q^2 = \sigma_u^2$, proving Lemma 1. Expected gross profit is $\lambda E[q^2] = \sigma_u H Q e / 2$. Its marginal value equals χe at an interior optimum; projection onto $[0, 1]$ gives (23). For $Q = 0$, the no-information allocation in the main text applies.

With market parameters fixed, e_m^* is proportional to Q_C and λ_m^* to Q_C^2 at interior choices. Substitution into (25) proves Proposition 2. For equal $\delta_m, \mu_m^0, \chi_m$,

$$\frac{\ell_L}{\ell_S} = \frac{G_L T_S}{G_S T_L}, \quad \frac{\Omega_L}{\Omega_S} = \frac{v_L}{v_S} \left(\frac{G_L}{G_S}\right)^2 \frac{T_S}{T_L}.$$

These ratios yield (27), whose interval is nonempty when $v_S/v_L < T_L/T_S$. At the precision cap, impact is $HQ/(2\sigma_u)$, so the interior squared-exposure comparison must be replaced.

If yield conversion uses regime-specific prices, its change is instead

$$\Delta \left(\frac{\lambda_m^*}{T_m P_m^0} \right) = \frac{H_m^2}{4\chi_m T_m} \left(\frac{Q_1^2}{P_{m1}^0} - \frac{Q_0^2}{P_{m0}^0} \right). \quad (46)$$

For $Q > 0$ and $e > 0$, Gaussian conditioning also gives $\text{Var}(\tilde{w} \mid p) = Q^2(1 - e^2/2)$. Thus $e^2/2$ measures proportional variance resolution; absolute residual uncertainty need not fall across regimes.

B.5 Information Aggregation and Subsequent Adjustment

In the two-dealer extension, conditional gross profit is $\sum_{j=1}^2 q_{mj}(H_m z_m - \lambda_m q_{mj})$. The first-order condition at each dealer is unchanged. Adding expected profits and subtracting the research cost paid once gives (29).

For $Q > 0$, write $e_m = \hat{e}_{mC}$. Since the same signal enters both orders,

$$Y_m = 2 \frac{\sigma_{u,m}}{e_m Q} z_m + u_{m1} + u_{m2}.$$

Independence of liquidity orders implies

$$\text{Var}(Y_m) = 6\sigma_{u,m}^2, \quad \text{Cov}(\tilde{w}, Y_m) = 2\sigma_{u,m} e_m Q. \quad (47)$$

Let $\mathcal{F}^{\text{pool}}$ contain public information, observed precisions, and all dealer flows from both bond markets. Since Y_m is measurable with respect to this information, iterated expectations and Gaussian conditioning give

$$E[p_m^{\text{pool}} \mid Y_m] = P_m^0 + \frac{H_m e_m Q}{3\sigma_{u,m}} Y_m, \quad (48)$$

$$\bar{p}_m^{\text{init}} = P_m^0 + \frac{H_m e_m Q}{4\sigma_{u,m}} Y_m. \quad (49)$$

Public information and observed precisions are suppressed in the conditioning notation. Subtraction proves (30); substituting the interior precision and applying the yield conversion gives (31). At first order, conversion at the average initial price also equals the average of the two initial yield changes.

Finally, each dealer's initial information is contained in $\mathcal{F}^{\text{pool}}$, so

$$E[p_m^{\text{pool}} - p_{mj}^{\text{init}} \mid y_{mj}, \mathcal{I}, \{e_k\}] = 0.$$

The same iterated-expectations argument gives zero expected further price revision conditional on pooled information. For $Q = 0$, all informational responses are zero.

B.6 Endogenous Commitment Choice

The baseline conditions on commitment. This extension adds a commitment decision before public updating and trading, leaving implementation, repayment, and market clearing unchanged. The decision maker observes capacity θ and a private nonfinancial payoff η from committing, expressed in resource-equivalent units. This payoff captures heterogeneous preferences or stakeholder pressure; it does not directly add to repayment resources R_C . Assume that η is independent of θ , has a continuous distribution F_η , and is not observed by investors. The decision maker internalizes the implementation burden and chooses

$$C^*(\theta, \eta) \in \arg \max_{C \in \{0,1\}} \{C\eta - B_C^*(\theta)\}. \quad (50)$$

Assume that both choices occur with positive prior probability.

Let $D(\theta) = B_1^*(\theta) - B_0^*(\theta) > 0$. Then

$$C^*(\theta, \eta) = 1 \iff \eta \geq D(\theta), \quad D'(\theta) = -[d_1(\theta) - d_0(\theta)] < 0. \quad (51)$$

Higher capacity reduces the additional burden of committing. Hence

$$p(\theta) \equiv \Pr(C = 1 \mid \theta) = 1 - F_\eta(D(\theta)) \quad (52)$$

is increasing in capacity wherever the density of η is positive. Commitment remains imperfectly informative because firms also differ in η ; it does not reveal capacity or require a single motive.

Investors account for this selection. Relative to the pre-decision prior f_0 , beliefs after observing the choice satisfy

$$f(\theta \mid C = c) = \frac{f_0(\theta)p(\theta)^c[1 - p(\theta)]^{1-c}}{\int_0^\infty f_0(t)p(t)^c[1 - p(t)]^{1-c} dt}, \quad c \in \{0, 1\}. \quad (53)$$

If the public signal r is released after the commitment choice, with its noise independent of η and θ , the posterior for a committing firm becomes

$$f_1(\theta \mid C = 1, r) = \frac{f_0(\theta)p(\theta) \exp[-\pi(r - \theta)^2/2]}{\int_0^\infty f_0(t)p(t) \exp[-\pi(r - t)^2/2] dt}. \quad (54)$$

Thus both the commitment decision and accompanying public information enter the burden moments used in the main text.

Since $p(\theta)$ increases and $B_1^*(\theta)$ decreases with capacity, selection alone implies

$$E[B_1^* \mid C = 1] - E_0[B_1^*] = \frac{\text{Cov}_0(B_1^*, p(\theta))}{E_0[p(\theta)]} \leq 0. \quad (55)$$

This favorable selection offsets part of the additional implementation burden, but does not necessarily dominate it. Specifically,

$$\Delta \mathcal{B} = E_0[D(\theta)] + \{E[B_1^* \mid C = 1, r] - E_0[B_1^*]\}. \quad (56)$$

Expected burden falls only if the second term is sufficiently negative. This channel requires $\phi_0 > 0$: if $\phi_0 = 0$, the pre-commitment burden is zero and cannot fall further.

With $\Delta R = 0$, the conditions $\Delta \mathcal{B} < 0$ and $\ell_S > \ell_L$ therefore continue to imply declines in both spreads, with a larger short-maturity decline and a steeper credit curve. Selection does not determine the change in residual burden uncertainty. Stronger information acquisition and a larger increase in long-maturity yield responses still require $Q_1 > Q_0$, interior research choices, and $\Omega_L > \Omega_S$. Endogenous commitment supplies a selection mechanism for public updating; it does not make the conditional pricing and trading predictions unconditional or establish an empirical causal effect.

Appendix C Enhanced TRACE Transaction Cleaning

I use the Enhanced TRACE Bond Transaction Data Service and match trades to the bond sample by exact nine-digit CUSIP. The separate Rule 144A feed is excluded.

Because TRACE records trades at the message level, I reconstruct each transaction's reporting history using the CUSIP and first-trade control identifiers. I retain the terminal valid message after corrections and drop transactions whose final status indicates cancellation or reversal. When correction and cancellation messages have the same reporting time, the corrected replacement receives priority.

I require positive par amount and a reported price between \$20 and \$200 per \$100 of par value. I exclude when-issued, specially flagged, and as-of trades. For specifications using transaction yields, I apply the reported yield sign and retain yields between -5% and 50% . Before constructing order-flow intervals, I remove duplicate records with the same CUSIP, execution time, price, par amount, and customer direction.

Customer trades are identified from the reported counterparty type, and direction is determined from the reporting dealer's side: a dealer purchase is a customer sale, while a dealer sale is a customer purchase. Transaction size is measured by reported par amount. Event windows, trading-hour restrictions, aggregation, and specification-specific sample filters are applied after transaction cleaning.

Appendix D Additional Tables

This section reports maturity-group spread changes, a separate test of emissions predictability before and after commitment, and the prediction models used to construct raw monthly credit-curve innovations.

Table D2: Credit-Curve Predictability Before and After Commitment

Dependent variable	Actual emissions improvement (log points)	
	Scope 1	Scope 1+2
	(1)	(2)
AdjCI	0.047** (2.77)	0.040** (3.19)
AdjCI $\times$ Post	-0.010 (-0.14)	-0.009 (-0.19)
Implied post-commitment slope	0.037 (0.54)	0.031 (0.78)
Issuer fixed effects	Yes	Yes
Target-year fixed effects	Yes	Yes
Post-commitment level control	Yes	Yes
Observations	641	641
Issuers	122	122

Notes: The dependent variable is actual emissions improvement, $\log(1 + E_{iF}) - \log(1 + E_{i,F+1})$, in log points. Scope 1+2 includes location-based Scope 2 emissions. This is a separate specification using actual improvement, with a different sample and control set from Table 7. The twelve-month AdjCI signal is standardized using its pre-commitment distribution in this sample. Its coefficient measures the pre-commitment predictive slope; AdjCI $\times$ Post measures the post-minus-pre change. The implied post-commitment slope is their sum, with its standard error calculated using the covariance between the two coefficient estimates.

All specifications include issuer fixed effects, target-year fixed effects, and a post-commitment level control. Standard errors are two-way clustered by issuer and target fiscal year; t -statistics appear in parentheses. Significance uses a t distribution with $\min(G_{\text{issuer}}, G_{\text{year}}) - 1$ degrees of freedom. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D1: Green Commitments and Credit Spreads by Maturity Group

Dependent variable	Credit spread (basis points)		
	(1)	(2)	(3)
<i>Panel A. Main unbalanced sample</i>			
Post commitment $\times$ Short-maturity bond	-5.23 (-1.44)	-8.35** (-2.19)	-8.56** (-2.27)
Post commitment $\times$ Long-maturity bond	-0.01 (-0.00)	1.94 (0.50)	1.57 (0.41)
Change in long–short credit-spread differential ($\beta_L - \beta_S$)	5.21* (1.80)	10.30*** (3.51)	10.14*** (3.47)
Observations	73,293	73,293	73,293
Issuers	151	151	151
Bonds	1,802	1,802	1,802
Within R^2	0.002	0.078	0.091
<i>Panel B. Balanced sample</i>			
Post commitment $\times$ Short-maturity bond	-7.18 (-1.55)	-8.76* (-1.82)	-9.43* (-1.94)
Post commitment $\times$ Long-maturity bond	2.97 (0.59)	4.50 (0.99)	3.79 (0.83)
Change in long–short credit-spread differential ($\beta_L - \beta_S$)	10.15*** (4.35)	13.26*** (4.01)	13.22*** (4.07)
Observations	39,792	39,792	39,792
Issuers	103	103	103
Bonds	829	829	829
Within R^2	0.006	0.105	0.118
Bond fixed effects	Yes	Yes	Yes
Calendar-month fixed effects	Yes	Yes	Yes
Issuer-month fixed effects	No	No	No
Bond characteristics	No	Yes	Yes
Firm characteristics	No	No	Yes

Notes: Credit spread is the corporate bond yield minus the maturity-matched Treasury yield. Short (long) denotes maturity at commitment at or below (above) the issuer-specific median. Samples and characteristics follow Table 5. The first two rows report group-specific post-minus-pre coefficients, β_S and β_L ; the third reports their difference, calculated from unrounded estimates. These specifications use calendar-month rather than issuer-month fixed effects to estimate the group-specific changes. Parentheses contain t -statistics based on two-way clustering by issuer and calendar month. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D3: Out-of-Sample Prediction of Monthly Issuer Credit-Curve Changes

Panel A. Prediction years 2012–2018							
Variable	2012	2013	2014	2015	2016	2017	2018
Lagged credit-curve slope	-84.62	-64.35	-113.04	-76.14	-70.35	-62.02	-54.69
Change in issuer spread level	-6.50	-8.03	-2.78	-6.16	-6.02	-7.06	-6.92
Peer credit-curve change	-6.48	-3.06	-1.69	-0.70	-0.08	1.30	1.34
Peer spread-level change	10.10	7.21	1.75	4.27	3.56	5.23	5.18
Mean remaining maturity	-22.70	-20.79	-17.45	-13.39	-16.46	-20.43	-20.64
Mean rating score	-34.32	-24.20	-26.85	-20.29	-13.45	-10.88	-11.17
Mean log amount outstanding	35.93	29.62	26.98	27.30	24.16	29.69	31.45
Log number of bonds	21.12	5.57	4.30	-1.80	-1.22	-4.70	-6.85
Issuer indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month-of-year indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Training observations	1,139	1,812	2,563	3,378	4,316	5,459	6,749
Training issuers	54	57	66	70	87	104	113
Panel B. Prediction years 2019–2025							
Variable	2019	2020	2021	2022	2023	2024	2025
Lagged credit-curve slope	-48.43	-44.78	-44.06	-41.42	-38.44	-38.08	-36.51
Change in issuer spread level	-6.04	-6.55	-10.78	-9.85	-10.66	-11.21	-11.05
Peer credit-curve change	1.38	1.47	2.14	2.08	2.57	3.16	3.18
Peer spread-level change	4.37	4.72	5.91	5.38	6.51	7.17	7.11
Mean remaining maturity	-20.14	-20.93	-20.40	-17.19	-17.55	-16.86	-14.05
Mean rating score	-10.35	-8.32	-5.85	-3.53	-2.71	-1.72	-0.17
Mean log amount outstanding	25.18	22.21	19.66	14.77	9.12	7.95	7.24
Log number of bonds	-7.26	-8.07	-8.03	-6.92	-6.88	-6.35	-4.54
Issuer indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month-of-year indicators	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Training observations	8,170	9,663	11,244	12,858	14,560	16,269	17,975
Training issuers	124	129	139	147	149	150	151

Notes: The dependent variable is the monthly change in the issuer credit-curve slope. Each column estimates the prediction model using only calendar years before the reported prediction year. The models use lagged curve information, issuer spread changes, peer changes, maturity, rating, bond amount, bond counts, issuer indicators, and month-of-year indicators. Continuous variables are standardized within each training sample.
The prediction models are fitted on earlier calendar years; some predictors describe contemporaneous credit-market conditions. The raw monthly credit-curve innovation is the realized slope change minus this prediction. Reliability adjustment, aggregation, and pre-commitment standardization subsequently produce AdjC1. Indicator coefficients are omitted.

[Return to text.](#)