Call Signal: What Do Investors Learn from a Borrower's (Non-)Call Decision?

Lin Ma[†]

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Abstract

Callable bonds account for a large share of the U.S. corporate fixed income market, and about 45% of call options are exercised in the six months immediately following the end of the call protection period. I develop a model showing that a callable debt contract allows outside investors to learn private information about the borrower from its voluntary decision to prepay – and, by the same logic, from the absence of that decision – even though asymmetric information per se does not create any deadweight loss. Consistent with the model, I find that issuers' credit default swap (CDS) spreads rise by 15 to 34 basis points in the six months following a decision not to exercise an in-the-money call option, while spreads remain stable for issuers that do call. Non-calling issuers' subsequent operating performance also deteriorates relative to that of calling peers.

Keywords: Callable Bonds; Asymmetric Information; Credit Default Swaps
JEL classification: D82; G32; G14

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† Halle Institute for Economic Research (IWH) and Friedrich Schiller University Jena (FSU); lin.ma@iwh-halle.de.

1 Introduction

A callable debt contract allows the borrower to prepay before the maturity date at its own discretion. In a frictionless setting, the borrower would prepay early only when it can refinance at a lower cost of financing. Frictions such as private information that arrives after the contract is signed can alter this decision, which in turn lets outside investors infer that private information from observing whether the borrower exercises the option. A large literature focuses on the optimal timing of exercising this option in response to interest environment changes and other frictions. This paper investigates what outside investors can learn from a borrower's decision to exercise — or not to exercise — the embedded call option.

I develop a model of a callable debt contract in which this channel operates. The model starts from the Tirole (2006) setup where a firm raising external funds to finance a fixed scale investment project. After the contract is signed, the borrower privately learns whether it is in a good or a bad state and receives an intermediate cash flow, which the borrower can reinvest, retain, or distribute. The return on the project depends on the state and firm's cash choice. I solve for the payoff optimal decision which borrower takes and the lender's required payoff under different financing arrangements.

The model delivers two main results. First, embedding a call option lowers the risk the lender must price into the pooled contract signed before information arrives, and hence reduces the borrower's cost of credit ex ante. This indicates that the call option has value even in a constant-interest-rate environment, and it can help explain why callable bonds dominate the corporate fixed income market: according to Becker et al. (2024), the callable share of new corporate bond issuance in the United States rose from 35% in 2000 to 89% in 2020. Second, the callable contract induces only good-state borrowers to prepay voluntarily, and it is costly for bad-state borrowers to mimic them, so the call decision reveals the borrower's state, whether or not the borrower can refinance afterwards. This complements the standard interest-cost explanation of why issuers exercise call options.

To test the model's predictions, I follow Xu (2018)'s event-study design around the earliest date on which the call option can be exercised. I construct a sample of 265 non-overlapping events of 182 non-financial firms between 2000 and 2021 in the United States, restricting to bonds tuning callable at a fixed price at least three years before

maturity. I then test whether the issuer's credit default swap (CDS) spread and its real operating performance change in response to the issuer's call decision.

I document two key results. First, the issuer's CDS spread increases by 15–34 basis points in the six months following a decision not to call at the end of the protection period. The effect is mainly driven by bonds whose call option is in the money at the time of the decision, that is, bonds whose coupon rate exceeds the prevailing refinancing rate. This indicates that the credit market reacts to the borrower's call decision and promptly updates its beliefs about the borrower's credit risk. Second, non-calling firms' operating performance, measured by return on assets, EBITDA margin and asset growth, deteriorates relative to that of calling peers over the following two years. This is consistent with the model's prediction that the call decision reveals the borrower's private information.

These findings suggest that a decision not to call an in-the-money bond is informative bad news about credit quality, which matters for investors, credit analysts and rating agencies that monitor callable bonds. They also suggest that the value of an embedded call option should reflect not only its direct payoff to the issuer across interest-rate paths but also the information its exercise reveals to lenders.

2 Literature Review

This paper contributes to the literature in a number of ways. First, the paper extends the literature on the rationale of callable debt contract. For example, Bodie and Taggart (1978) show that a call provision can mitigate underinvestment for firms with growth options. Robbins and Schatzberg (1986) suggest that callable debt contract can signal good prospects in the absence of cost of weakened risk-sharing with capital markets. In contrast, Schall and Siegel (2016) show that a call provision can worsen investment decisions even under symmetric information. The study closest to this paper is Chen, Mao and Wang (2010), which shows that an issuer's call decision can reveal its operating performance and level of investment activity, and argues that a callable debt contract can induce firms to withdraw from poor investment opportunities and thereby protect bondholders. This paper complements that work by illustrating a different scenario, in which the call option remains valuable even when the firm's investment prospects are unchanged. Relative to the earlier theory, the model in this paper makes the borrower's

own reinvestment decision the device that reveals the state, so revelation is endogenous to the contract. Because the probability of success is the same in both states and unaffected by reinvestment, the separation does not rely on the borrower changing the riskiness of the project, as in risk-shifting models.

Two other papers in the banking literature, Deng, Fu and Huang (2025) and Aliyev, Danmark and Lando (2025), show that banks that fail to redeem their contingent convertible securities at the earliest possible date raise investor concerns, a pattern similar to the first empirical finding in this paper. This paper differs in that it focuses on a sample of industrial firms and emphasise the information channel rather than the regulatory or reputational channels, the latter two being more important for the banking sector.

This paper also speaks to the literature on information revealed by non-actions along passage of time. Giglio and Shue (2014) show that the absence of news over time can reveal negative information in mergers and acquisitions. Gao et al. (2022) document that investors react more strongly to negative news released after a period of insider silence. This paper contributes new evidence from the fixed-income market, showing that a callable bond issuer's decision not to call is itself informative.

Lastly, this paper also contributes to the literature on optimal early refinancing decision of corporate bonds driven by factors other than the interest-cost-saving incentive. Xu (2018) and Ma, Streitz and Tourre (2023) show that rollover risk and maturity-management incentives can also trigger early refinancing. Beaumont, Schumacher and Weitzner (2023) argues that issuers may delay exercising an in-the-money call option to protect institutional investor relationships relevant for future issuance. This paper adds an information channel: firms with favourable private information choose to prepay for their own payoff, this choice reveals their information to outside investors.

3 Model

3.1 Setup

Consider a firm with assets A that can undertake a project requiring investment $I > A$ at $T = 0$. The project succeeds with probability p and pays a success payoff $R_k(j)$, where $k \in \{G, B\}$ is the firm's privately known state and $j \in \{0, r\}$ is its reinvestment

decision at $T = 1$; the project pays nothing upon failure, regardless of state or decision. The success probability p is common across states and unaffected by the reinvestment decision: the intermediate cash flow r does not buy private consumption, but instead raises the project's success payoff. After the project begins, the firm privately learns its state k, which is either good (G, with probability α) or bad (B, with probability $1 - \alpha$). At $T = 1$, an intermediate cash flow $r < I - A$ is realised regardless of state. The firm then decides whether to retain this cash or reinvest it in the project. If retained, the cash stays with the firm: the lender can seize it upon failure, but the firm keeps it upon success. If reinvested, the cash is sunk into the project and is unrecoverable either way. For tractability, I assume it is optimal for each firm to either reinvest the full amount r or retain it entirely. Figure 1 illustrates the model's timeline.

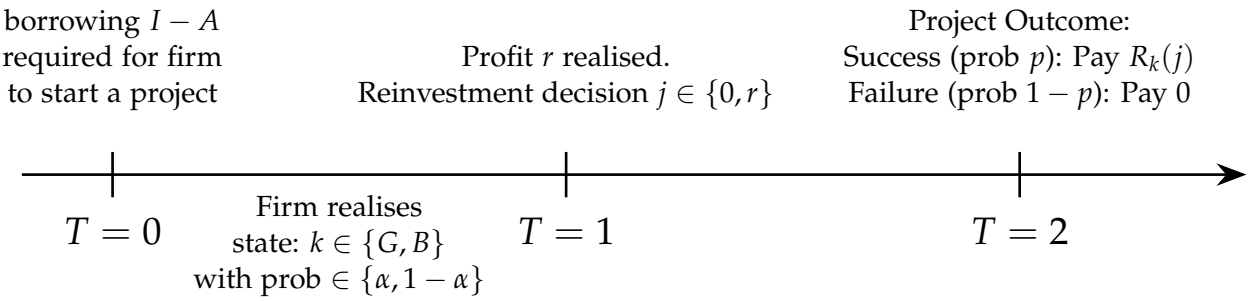


Figure 1: Model timeline

Reinvestment affects the success payoff differently by state, and I allow each state's baseline (no-reinvestment) payoff to differ freely:

$$R_G(r) = R_G(0) + \delta, \qquad R_B(r) = R_B(0) + \Delta, \qquad \Delta > \delta > 0.$$

A natural way to motivate $\Delta > \delta$ is to view $R_k(j)$ as a common, concave (diminishing-returns) function of reinvestment, evaluated at a state-specific starting point[1]: if the bad state corresponds to a lower point on this curve, the marginal payoff from reinvesting the same amount r is larger for the bad-state firm than for the good-state firm, as Figure B.1

[1]Another way to illustrate $\Delta > \delta$ is to treat these as private benefit of consuming cash, while R stays constant. The model results stay the same. The conclusion form the private benefit assumption also indicate lenders are worse off in bad state, as the potential cash collateral when project fails would be used for private benifit consumption.

illustrates. This interpretation also naturally suggests $R_B(0) < R_G(0)$, though none of the results below require this ordering – they depend only on the increments Δ and δ, never on the relationship between $R_G(0)$ and $R_B(0)$.

Consider a firm that invest in a marketing campaign for a new product. Returns to marketing are concave: the first dollars reach customers who do not yet know the product, while later dollars mostly reach customers who already buy it. A firm in the bad state, with less customers reached before the reinvestment, is on the steep part of this curve, so the additional campaign costs r would raise payoff by relative large Δ. A firm in the good state, with strong baseline demand, is already close to saturation, so the same spending raises its payoff by only $\delta < \Delta$.

The following ordering of payoffs ensures that the firm in the bad state always reinvests r, while the firm in the good state always retains it:

$$\Delta \ > \ (1+i)r \ > \ r \ > \ \delta \tag{1}$$

Here i is the credit spread required for the lender to break even. The left inequality ensures the bad-state firm always prefers to reinvest: its payoff loss from failing to do so, Δ, exceeds the reduction in borrowing costs it would gain by retaining r as collateral instead. The right inequality ensures the good-state firm always prefers to retain r: doing so raises its expected payoff by r upon success, which exceeds the reinvestment gain δ it forgoes. I further assume that each state's payoff comfortably covers the largest face value it may be asked to repay,

$$\min\{R_G(0),\, R_B(0)\} \ > \ R^L,$$

so that repayment upon success is always feasible regardless of state.

Since the firm in the good state retains r, the lender can recover this cash if the project fails. The firm in the bad state reinvests r into the project, so it is unrecoverable regardless of outcome. I assume that lenders are risk-neutral and operate in a competitive market. The lender's break-even condition is then:

$$R^L \geq \frac{I - A - \alpha(1-p)r}{p} \tag{2}$$

The credit spread i required for break-even satisfies:

$$1 + i \geq \frac{I - A - \alpha(1-p)r}{(I-A)p} \tag{3}$$

The credit spread is lower than in the absence of the intermediate cash flow because the good-state firm's retention of r provides partial collateral to the lender upon failure. In other words, the lender is better off when the borrower is in the good state.

Under this baseline (non-callable) two-period loan, the good-state firm retains r as implicit collateral, while the bad-state firm reinvests it. Because the state can only be learnt at $T = 1$, the bad-state firm effectively receives a cross-subsidy from the pooled pricing.

3.2 Callable Debt

Suppose instead that the lender embeds a costless call option, allowing the firm to voluntarily prepay r at par at $T = 1$. Under Assumption 1, the good-state firm exercises the call, as i is always positive; the bad-state firm does not, since its reinvestment payoff gain Δ continues to exceed the cost of prepaying, $(1 + i')r$, where $i' \leq i$ is the (lower) credit spread under the callable contract derived below. Here, neither chooses to be seen as a particular type, so the information the decision reveals is a by-product and not yet a signal chosen for its benefit. This reduces the lender's required payoff under the callable contract at $T = 0$ to R'^L:

$$R'^L \;=\; \frac{I - A - \alpha r}{p} \;<\; R^L,$$

because the lender now collects r from the good-state firm with certainty at $T = 1$, rather than only upon project failure. This yields:

Proposition 1 (Callable debt benefits both types)**.** *Relative to the non-callable contract, the good-state borrower's expected payoff R'^B_G under the callable contract is strictly higher,*

$$R'^B_G \;\geq\; p\big[R_G(0) - R'^L + (1+i')r\big] \;>\; p\big[R_G(0) - R^L + r\big] \;=\; R^B_G,$$

and the bad-state firm's expected payoff is weakly higher,

$$R_B'^B \;=\; p\big[R_B(r) - R'^L\big] \;\geq\; p\big[R_B(r) - R^L\big] \;=\; R_B^B,$$

so the firm would strictly prefer to sign the callable contract at $T = 0$, before its state is learnt.

The gain from the callable contract is embedded entirely in the lower face value R'^L, since reinvestment always brings the bad-state firm's payoff to $R_B(r)$, regardless of which contract is in place. Intuitively, embedding the call option removes a source of risk the lender previously had to price – namely, that a good-state firm might retain r and still default – and this reduction in the lender's required return is shared by both types through a lower face value $R'^L < R^L$. When capital is costly to the lender, the firm is willing to pay a call premium up to $c' \leq i - i' = \alpha \cdot r/(I - A)$, the full value of the reduction in spread.

3.3 Prepayment with Refinancing

Suppose further that a firm which exercises the call can subsequently refinance the remaining balance $I - A - r$ at a rate reflecting the market's updated (separating) belief that the borrower is in the good state, as issuers often do when they retire a bond early. The lender's required payoff on the refinancing loan becomes:

$$R_G''^L \;\geq\; \frac{I - A - r}{p} \;<\; R'^L.$$

This delivers an even lower face value than callable debt alone. Being identified as a good-state borrower is now valuable, so the decision acts as a signal in the conventional sense, and a bad-state borrower has a reason to pretend to be one. The key question is whether the bad-state firm would find it profitable to mimic, by prepaying r – and so forgoing the reinvestment that would otherwise raise its payoff to $R_B(r)$ – in order to access this favourable refinancing rate.

Proposition 2 (No mimicry)**.** *Under Assumption 1, the bad-state firm strictly prefers not to*

mimic the good-state firm's prepay-and-refinance strategy, as long as

$$p\Delta \;\geq\; (1-\alpha)r.$$

This condition is guaranteed by Assumption 1: multiplying the left inequality by p gives $p\Delta > p(1+i)r$. Since $r < I - A$, the break-even condition (3), evaluated at equality, gives $p(1+i) = 1 - \alpha(1-p)r/(I-A) > 1-\alpha$, so that $p\Delta > p(1+i)r > (1-\alpha)r$. In this case, the bad-state borrower is strictly worse off mimicking the good-state borrower's strategy: by prepaying, it gives up the reinvestment gain Δ in exchange for a refinancing rate whose benefit is bounded by what the pooled contract already offered. Voluntary prepayment at $T = 1$ is therefore a credible, self-enforcing signal of the good state.

3.4 Put Options and Short-Term Debt

This section compares the callable contract with a contract that makes the early repayment of r mandatory, equivalently short-term debt or a put option. The comparison speaks to the literature in which the choice of short debt maturity is itself a device through which firms reveal private information (Diamond, 1991). Consider a contract that instead makes repayment of r at $T = 1$ mandatory, equivalent to structuring r as short-term debt or embedding a put option in the contract. Because repayment at $T = 1$ is certain regardless of state, the lender's required face value is identical to that under the prepay-and-refinance contract, $R'''^{L} = R''^{L}$. However, mandatory repayment strips the bad-state firm of its ability to reinvest r, so it is left with its unreinvested payoff $R_B(0)$:

$$R_B'''^{B} \;=\; p\big[R_B(0) - R'''^{L}\big] \;<\; p\big[R_B(r) - R'^{L}\big] \;=\; R_B'^{B}.$$

Proposition 3 (Callable debt dominates putable contract)**.** *For any $\alpha < 1$, the ex-ante expected payoff to an as-yet-uninformed borrower – evaluated at $T = 0$, before its state is realised – is strictly higher under the callable contract than under the put-option or equivalently, the short-term debt contract. The comparison shows that the callable contract as it gives the same reduction in the pooled rate while preserving the bad-state borrower's option to reinvest.*

3.5 Equity financing

As a further comparison, consider financing the project instead with pure equity: the investor receives a fixed ownership share θ of whatever payoff the firm realises at $T = 2$, rather than a fixed face value. Appendix A shows that callable debt also dominates the financing of the project with pure equity as long as $r > 0$. This holds because equity claims a share of the realised payoff in every state, while debt only prices in the expected shortfall the lender bears in the failure state, the entrepreneur's ex-ante expected payoff is strictly higher under callable debt.

This comparison with equity is motivated by the well established dividend signal story in the literature. Dividend payment is also a voluntary and discretionary action that reveals a firm's private information in much the same way. The purpose of this comparison is not to argue that the call option embedded in the debt contract is a better signal than a dividend-based signal. Instead, it illustrates that a firm can choose callable debt financing in the first place.

In summary, under this simple model, the callable debt contract dominates both the non-callable contract, the putable contract, and equity contract. Voluntary prepayment at $T = 1$ is a credible, self-enforcing signal of the good state, since the bad-state firm has no incentive to mimic it.

4 Empirical Results

To test the model's predictions, I examine how the market and issuers' fundamentals respond to the call decision. The model implies that a decision not to call is informative bad news about the borrower's state. If investors can read the decision, the market's assessment of the issuer's credit risk should rise after a non-call, particularly when the call option is in the money and forgoing it is costly. And if a non-call reflects unfavourable private information, the issuer's real outcomes should deteriorate relative to those of calling peers. I therefore need a sample of callable bonds with known call schedules, observed call decisions, measure of market beliefs regarding the borrower, and firm's real performance data.

4.1 Data sample

I construct the data sample from the Mergent Fixed Income Securities Database (Mergent). Mergent contains contractual details of corporate bonds publicly issued in the United States, including the precise call schedule if an issue embeds a call provision. Figure 2 illustrates the call schedule of a typical callable bond. It comes with a call protection period covering the first t months after the bond is issued. The bond is either non-callable or only make-whole callable during this period, which makes early redemption of the bond very expensive. After the end of the call protection period, the bond becomes callable starting in month t, at a fixed price predetermined at issuance. If the issuer decides to exercise the option, it is obligated to inform bondholders of its redemption decision in advance, typically 30 days ahead. Thus, the month before the end of the call protection period is usually the earliest point at which investors can learn whether the bond will be called.

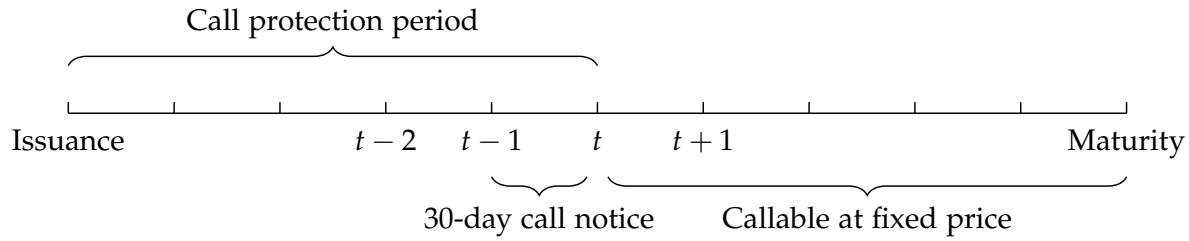


Figure 2: Call schedule

Mergent also provides a history of how a bond's outstanding balance changes over time, along with detailed descriptions of the events that give rise to such changes. This allows me to observe whether the call option is exercised around the time the bond becomes callable. I sample fixed-rate coupon-paying bonds issued by U.S. non-financial and non-utility firms that become callable at a fixed price at least three years before the maturity date. Calling soon after the protection period ends is common: as Figure 3 shows, about 45% of these bonds that turn callable from 2002 to 2021 are called within the six-month window after the end of the call protection period.

I link Mergent data to Compustat to obtain firms' financial information to measure the firm's real performance. I further supplement this sample with CDS data from IHS Markit, requiring that CDS data be available at the time the bond becomes callable. I

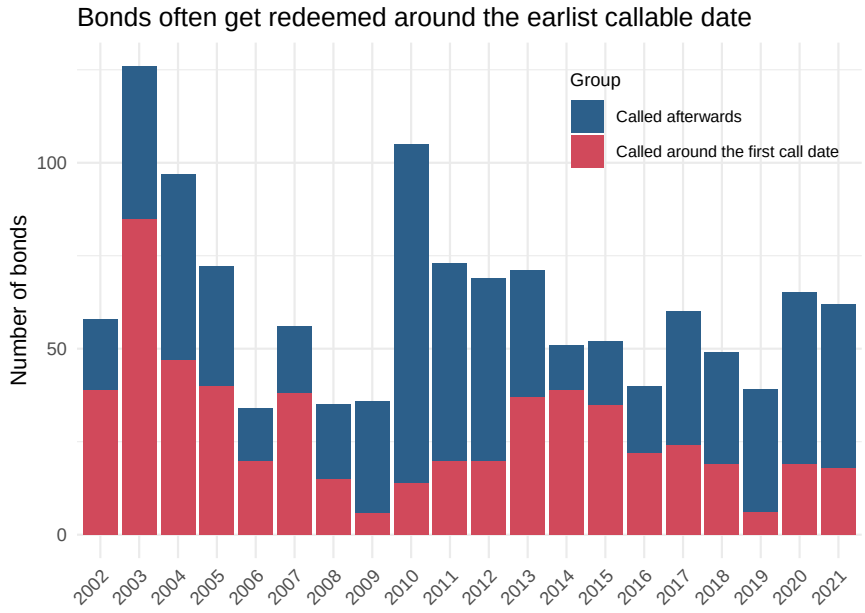


Figure 3: **Bonds turning callable and call exercises**
This figure shows the number of bonds turning callable (blue) and the number of bonds called within the six-month period after the end of the call protection period, by year.

use CDS spreads, rather than bond yields, to measure investors' beliefs for two reasons. First, a CDS spread is the market price of protection against the issuer's default, so it directly reflects the market's assessment of credit risk. Because CDS contracts are relatively standardised, spreads are comparable across issuers and over time. Second, bond yields cannot support a clean difference-in-differences comparison between calling and non-calling issuers. A bond that is called is often refinanced with a new bond that has a different coupon, maturity and call schedule, whereas a bond that is not called keeps its original characteristics. A comparison of yields would then mix changes in credit risk with changes in bond characteristics. The issuer-level CDS spread is instead defined on the same reference entity before and after the call decision, so it remains a continuous and comparable series for both groups. The final sample contains 265 bonds issued by 182 firms. Table 1 shows summary statistics for the sampled events of bonds turning callable.

Table 1: Descriptive statistics

This table shows summary statistics for the bond sample, including statistics on bond issue and issuer characteristics at the end of the call protection period.

	N	Mean	Min	P25	Median	P75	Max
Bond characteristics:							
Coupon rate (%)	265	7.7	2.6	6.5	7.8	8.9	9.6
Time to maturity when issued (yrs)	265	12.2	3.1	7.8	9.7	10.1	50.0
Time to maturity when callable (yrs)	265	7.3	3.0	4.0	5.1	5.5	39.5
Issuance amount ($M)	265	404	0.2	200	300	500	2,000
Issuer characteristics:							
CDS spread (bps)	265	322.6	9.6	120.9	251.2	448.5	944.5
Total asset ($M)	261	19,286	508	3580	6705	16,635	545,354
EBITDA margin(%)	261	23.7	-32.8	11.8	20.9	33.1	92.5
ROA (%)	261	1.8	-66.9	-0.6	2.7	5.8	40.0
Asset Growth (%)	261	3.7	-145.9	-2.8	2.5	11.8	156.6

4.2 Credit spread in response to non-call events

The borrower's call decision is indeed endogenous, as many factors can determine the issuer's call decision, in particular the interest-cost-saving motive. To control for this, I further filter the sample by option moneyness. This requires estimating each issuer's opportunity cost of refinancing one month before the bond becomes callable, as this is the earliest month in which the issuer can redeem the bond at the pre-specified call price. This refinancing cost is calculated as:

$$r^*_{i,t} = rf\ rate_{i,t} + CDS\ spread_{i,t} - CDS\ bond\ basis_t.$$

$rf\ rate_{i,t}$ is the 5-year treasury constant maturity rate in month t. $CDS\ spread_{i,t}$ is the 5-year CDS spread in month t for the *issuer* of bond i. $CDS\ bond\ basis_t$ is the median difference between the coupon rate of all fixed-rate callable corporate bonds issued in month t and the sum of $CDS\ spread_t$ and $rf\ rate_t$.

I define a call option as in-the-money (out-of-the-money) if the fixed coupon rate of the bond is higher (lower) than the refinancing cost one month before the bond becomes callable[2]. As Figure 4 shows, when the bond is out-of-the-money at the time it becomes

[2]A more precise measure of measuring moneyness is to include the prepayment penalty as described in (Ma, Streitz and Tourre, 2023). Using this measure will slightly alter the sample in this paper, while

callable, it is rare to see the issuer exercise the call option. This is expected, as a rational firm should not refinance at a higher rate. However, when the bond is in-the-money, a number of issuers choose not to call the bond, which is exactly the scenario depicted by the model in the previous section. To align with the asymmetric-information hypothesis, I focus for the remainder of the paper on the 151 events in which the option is in the money.

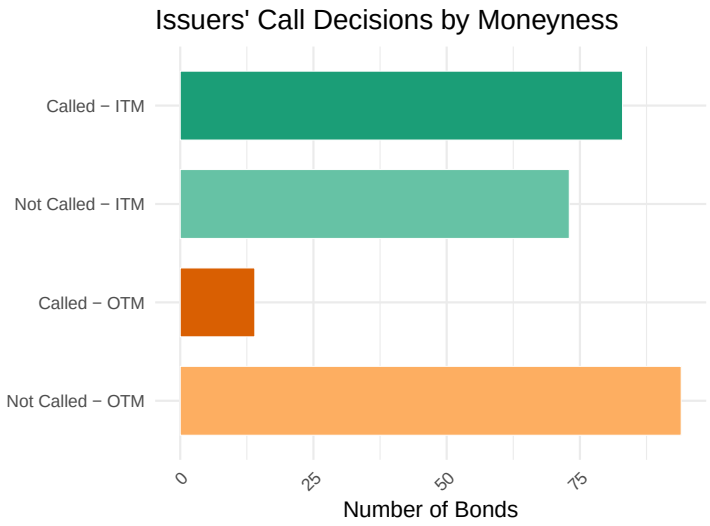


Figure 4: **Call exercise and option moneyness**
Number of call (no-call) events given option moneyness in the data sample. ITM (OTM) indicates whether the bond's coupon rate is higher (lower) than the issuer's refinancing cost right before the bond becomes callable. Called (Not Called) indicates whether the call option is (not) exercised within the six-month period after the bond becomes callable.

The length of the call protection period is determined at bond issuance and is plausibly exogenous to both the firm's private information and the interest-rate environment at the time the option becomes exercisable (Xu, 2018). This supports interpreting subsequent CDS movements as a response to the firm's call decision. As the model section described above, private information can be learnt by outside investors by observing the issuer's call decision during the event window when the call protection period ends, and

results remain similar.

this information should subsequently be reflected in the CDS market. Hence, I estimate

$$CDS_{i,j,t} = \sum_{\tau \in [-6,6]} \beta_\tau \cdot \mathbb{1}\{t = \tau\} + \alpha_i + \alpha_k + \varepsilon_{i,j,t}$$

where $t = 0$ denotes the first month after the end of the call protection period for bond i issued by firm j, $\mathbb{1}\{t = \tau\}$ is an indicator for relative event month τ, and α_i and α_k are event fixed effects and year+firm fixed effects.

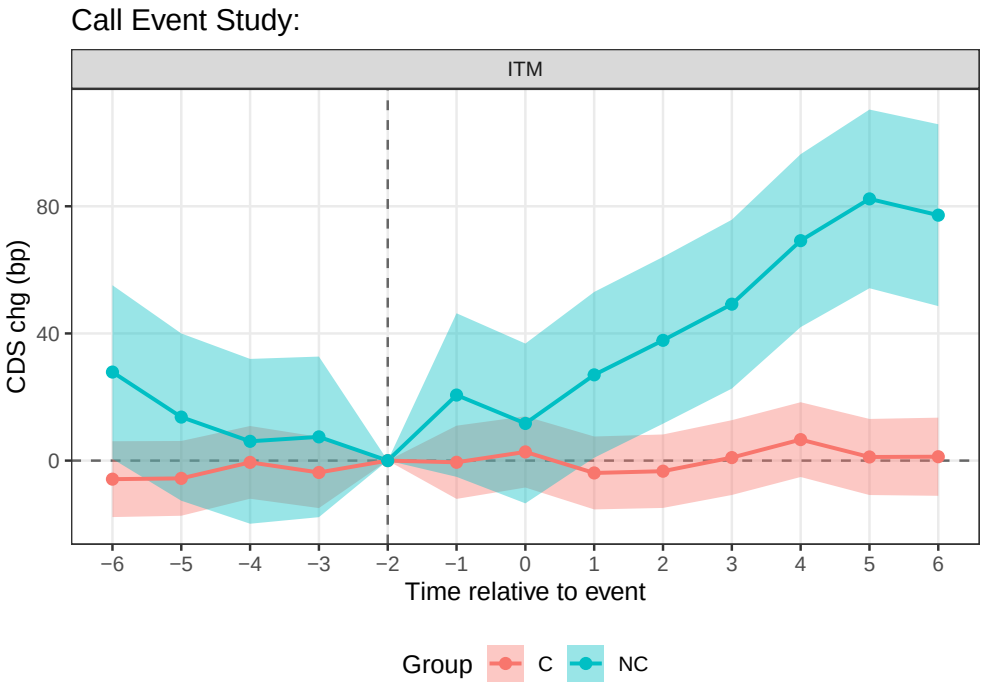


Figure 5: **CDS response to call decision**
This figure shows the event window from six months before to six months after a bond becomes callable at a fixed price ($t = 0$). The Y-axis shows the issuer's five-year CDS spread in the given month. The blue line shows results for called events, where the issuer exercised the option within the six-month window. The red line shows results for non-call events. Bonds are in-the-money at the end of the call protection period.

Figure 5 shows the results: when the option is ITM, the CDS spread gradually increases when the issuer chooses not to exercise the option. In contrast, the CDS spread remains stable if the issuer exercises the option. This result cannot be explained by non-

calling borrowers simply failing to refinance at as favourable a rate as called borrowers; rather, it suggests that the market's perceived default probability increased after observing a non-call event: investors infer that a firm forgoing a value-increasing prepayment opportunity is more likely to be preserving cash because it privately anticipates future distress.

The gradual rise of CDS spread when the issuer chooses not to exercise the option, rather than an immediate jump, is what one would expect, because the issuer can still redeem the bond after the earliest callable date, so silence in the first weeks is not conclusive. The longer the issuer stays silent, the less likely issuer is still willing to call, and the more investors infer that the issuer holds negative information that the market does not yet know.

Because the response builds up gradually rather than appearing at once, the average effect over the event window is the natural summary. To test the average effect, I employ the following difference-in-differences model:

$$CDS_{i,j,t} \;=\; Post_{i,j,t} \cdot NC_{i,j,t} \;+\; \alpha_i \;+\; \alpha_{\mathrm{k}} \;+\; \varepsilon_{i,j,t} \tag{4}$$

where *Post* is an indicator variable equal to one if the observation falls after the end of the call protection period, and *NC* is an indicator variable equal to one if the issuer did not exercise the call within six months of the end of the call protection period.

Table 2 reports the average effects from this panel regression. Column 1 shows that CDS spreads increase by about 15 basis points following a non-call decision, across all 265 sampled events. Column 2 shows that this effect is driven mainly by the ITM sample, where the increase is about 34 basis points. This result is economically significant, as the average CDS spread in my sample is 322.6 basis points. This result is consistent with the model predicts. When the option is out of the money, not calling is the optimal choice for every borrower, so it carries little information, and including these events dilutes the average effect. When the option is in the money, a borrower that forgoes such option is viewed as procession private information, and the market reacts accordingly. In column 3, I interact the log of the issuer's total assets before the event with the variable of interest. The negative coefficient indicates that this CDS increase following a non-call event is

Table 2: CDS response to call decision

This table shows estimated coefficients from model (4). *Post* is an indicator variable equal to one if the observation falls after the end of the call protection period. *NC* is an indicator variable equal to one if the issuer did not exercise the call within six months of the end of the call protection period. *Size* is the log of the firm's total assets reported before the end of the call protection period. Standard errors are clustered at the firm level.

	Dependent Var.: $CDS_{i,j,t}$		
Sample	Raw	ITM	ITM
	(1)	(2)	(3)
Post x NC	14.776**	34.424***	134.025***
	(6.407)	(6.290)	(47.907)
Post x NC x Size			−11.504**
			(5.238)
Observations	3,381	1,889	1,889
Event FE	Yes	Yes	Yes
Year + Firm FE	Yes	Yes	Yes
Adjusted R^2	0.931	0.883	0.884
Residual Std. Error	70.017 (df = 2828)	54.715 (df = 1582)	54.479 (df = 1580)

significantly attenuated for larger firms, those are more likely to be followed by analysts and subject to richer public disclosure, so a non-call decision reveals comparatively little that the market did not already suspect. This is consistent with existing literature that information asymmetry is greater for smaller, more opaque borrowers.

4.3 Firm outcome post non-call event

If the non-call decision does indeed reveal negative private information, this information should also be reflected in the firm's real outcomes. To test this hypothesis, I employ the following difference-in-differences strategy:

$$Y_{j,t} = Post_{i,j,t} \cdot NC_{i,j,t} + \alpha_i + \alpha_{\mathrm{k}} + \varepsilon_{i,j,t} \tag{5}$$

where $Y_{j,t}$ is firm j's real performance indicator at time t. *Post* and *NC* are defined as in model (4). I analyse how firms' operating results change over a $\pm$2-year event window centred on the end of the call protection period.

Table 3: Firm operating performance and the call decision

This table shows estimated coefficients from model (5). *ROA* is defined as $Net\ income_t / Total\ Assets_{t-1}$. *EBITDA Margin* is defined as $Net\ operating\ profit_t / Total\ Sales_t$. *Asset growth* is defined as $log(Total\ Assets_t) - log(Total\ Assets_{t-1})$. *Post* and *NC* are defined as in Table 2.

Dependent Var.	ROA	EBITDA Margin	Asset growth
	(1)	(2)	(3)
Post x NC	-0.023^{***}	-0.023^{**}	-0.012
	(0.006)	(0.012)	(0.021)
Observations	2,346	2,347	2,346
Year-Industry FE	Yes	Yes	Yes
R^2	0.812	0.839	0.653
Adjusted R^2	0.696	0.739	0.438
Residual Std. Error (df = 1449)	0.045	0.090	0.160

Table 3 reports estimates of how firms' operating results change depending on the observed call decision. Columns 1 through 3 show that non-calling firms have lower return-on-assets (ROA), EBITDA margins, and asset growth relative to firms in the control group after the end of the call protection period. These results, in particular the ROA result, are economically significant. This result is consistent with the information-asymmetry hypothesis: firms with negative private information are less willing to exercise the call option embedded in the debt contract at the earliest callable date.

5 Conclusion

This paper shows that a callable debt contract turns the borrower's decision to prepay into a credible signal of its private information. In the model, an intermediate cash flow is worth more when reinvested by a bad-state borrower than by a good-state borrower, so

only the good-state borrower finds it optimal to exercise the call option, and the bad-state borrower has no incentive to mimic the good-state borrower, even when prepayment would allow it to refinance on better terms. Exercise therefore credibly reveals the good state and, by the same logic, a decision not to exercise reveals the bad state. Because the lender collects the cash from good-state borrowers with certainty, the call option also lowers the cost of credit ex ante and hence has value even when interest rates are constant, a result that helps explain why callable bonds dominate corporate issuance.

The evidence is consistent with this mechanism. In the six months after call protection ends, issuers' CDS spreads rise by 15 to 34 basis points when the issuer does not call an in-the-money bond, while spreads remain stable for issuers that do call. The reaction is stronger for smaller issuers, for which information asymmetry is likely more severe. Non-calling issuers' return on assets, EBITDA margin and asset growth also deteriorate relative to those of calling peers over the following two years, which suggests that the market is updating its beliefs about issuer quality rather than reacting mechanically to forgone interest savings.

These results have implications for market participants and for the valuation of embedded options. For investors, credit analysts and rating agencies, a decision not to call an in-the-money bond is informative bad news about credit quality. Because the end of the call protection period is known in advance, silence at of short after that date is easy to identify and does not require waiting for the next accounting disclosure. For valuation and contract design, a call provision is worth more than its value as an interest-rate option: the information that exercise reveals to lenders lowers the cost of credit ex ante, which helps explain why callable bonds are so prevalent. More broadly, the results suggest that a discretionary decision that looks like inaction can carry information even when the decision-maker has no incentive to communicate. Future work could examine whether the same logic applies to other options embedded in financing contracts.

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Appendix

A Equity Financing

This appendix compares the callable debt contract of Section 3 with an alternative in which the project is financed with pure equity rather than debt. Under equity, the investor receives a fixed ownership share θ of whatever payoff the firm realises at $T = 2$, rather than a fixed face value. Unlike debt, an equity claim is not capped: it scales with whichever payoff level the firm actually reaches, in whichever state that occurs.

Setup and break-even condition

I maintain the assumption that each type takes the same reinvestment decision as under callable debt: the good-state firm retains r and the bad-state firm reinvests it, so that the realised success payoff is $R_G(0)$ in the good state and $R_B(r)$ in the bad state. Write the probability-weighted average success payoff across types as

$$R_m \;\equiv\; \alpha R_G(0) + (1-\alpha) R_B(r). \tag{A.1}$$

Because the investor's equity stake pays θ times the realised success payoff in either state, and nothing upon failure, the investor's expected payoff is $\theta\, p\, R_m$. Risk-neutral, competitive investors break even at $T = 0$ when this covers the amount invested:

$$\theta\, p\, R_m \;\geq\; I - A \qquad \Longleftrightarrow \qquad \theta \;\geq\; \frac{I-A}{p\, R_m}.$$

Evaluating this at equality, as throughout the paper, the entrepreneur retains a fraction $1-\theta$ of the realised payoff in every state, so the entrepreneur's ex-ante expected payoff under equity – evaluated at $T = 0$, before the state is realised – is

$$R_E^B \;\equiv\; (1-\theta)\, p\, R_m \;=\; p\, R_m - (I - A). \tag{A.2}$$

Comparison with callable debt

To compare this with callable debt, I evaluate the two propositions in Section 3 at their break-even values. From the Callable Debt subsection, $R'^L = (I - A - \alpha r)/p$ exactly, and the call premium result immediately below Proposition 1 gives $i' = i - \alpha r/(I - A)$; combining this with the break-even spread $1 + i \;=\; \big(I - A - \alpha(1-p)r\big)/\big[(I-A)p\big]$

from (3), evaluated at equality, yields

$$p(1+i') \;=\; \frac{I-A-\alpha r}{I-A}.$$

Using these two exact values in Proposition 1's payoffs $R_G'^B = p\big[R_G(0) - R'^L + (1+i')r\big]$ and $R_B'^B = p\big[R_B(r) - R'^L\big]$, the entrepreneur's ex-ante expected payoff under callable debt is

$$\begin{aligned} R_C^B \equiv\; & \alpha R_G'^B + (1-\alpha) R_B'^B \\ =\; & p\big[\alpha R_G(0) + (1-\alpha) R_B(r)\big] \;-\; pR'^L \;+\; \alpha\, p(1+i')\, r \\ =\; & p\, R_m \;-\; (I-A-\alpha r)\left[1 - \frac{\alpha r}{I-A}\right] \\ =\; & p\, R_m \;-\; (I-A) \;+\; \alpha r\left[2 - \frac{\alpha r}{I-A}\right]. \end{aligned} \tag{A.3}$$

Proposition 4. *Callable debt strictly dominates pure equity financing whenever $r > 0$:*

$$R_C^B - R_E^B \;=\; \alpha r\left[2 - \frac{\alpha r}{I-A}\right] \;>\; 0, \tag{A.4}$$

since $\alpha \in (0,1)$ and $r < I - A$ jointly imply $\alpha r/(I-A) < 1 < 2$. The two financing modes coincide only in the degenerate case $r = 0$, where there is no intermediate cash flow for debt to price.

Proof. Equation (A.4) follows directly from subtracting (A.2) from (A.3): the $p\,R_m - (I-A)$ terms cancel, leaving $\alpha r\big[2 - \alpha r/(I-A)\big]$. Since $r < I - A$ by assumption and $\alpha \in (0,1)$, the ratio $\alpha r/(I-A)$ lies strictly between 0 and 1, so the bracketed term is strictly between 1 and 2, and the whole expression is strictly positive whenever $r > 0$. At $r = 0$ both sides of (A.4) are zero. □

Intuitively, equity charges the entrepreneur a fixed rate θ on *all* of the realised payoff, in every state, whereas debt charges only for the expected shortfall the lender bears in the failure state, $\alpha(1-p)r$, leaving the entrepreneur the entire realised payoff above the face value. The weighted average R_m is exactly the object that governs the investor's payoff under equity, precisely because equity is a claim on the payoff *level* rather than a capped claim on it – the distinction that keeps R_m out of the debt break-even condition (2) in the first place.

Caveats

Two qualifications limit Proposition 4 to an interior comparison rather than a universal ranking. First, it presumes a face value R'^L satisfying both the lender's break-even condition and the feasibility bound $\min\{R_G(0), R_B(0)\} > R'^L$ actually exists; if $I - A$ is large relative to what the lower of the two states can repay, no such R'^L exists and pure debt is infeasible, so equity (or a debt-equity hybrid) becomes necessary on capacity grounds rather than because it is cheaper. Second, (A.2) presumes both types still take the same reinvestment decisions as under debt. Equity dilutes the entrepreneur's own stake in the payoff increments δ and Δ to $(1-\theta)\delta$ and $(1-\theta)\Delta$, so the ordering in Assumption 1 that induces the bad-state firm to reinvest may fail at a sufficiently high θ, in which case the bad-state firm would stop reinvesting once it captures only a fraction of Δ. When this binds, equity is worse than (A.4) indicates, since it would then also erode real investment value rather than merely pricing the intermediate cash flow less efficiently.

B Diminishing Returns to Reinvestment

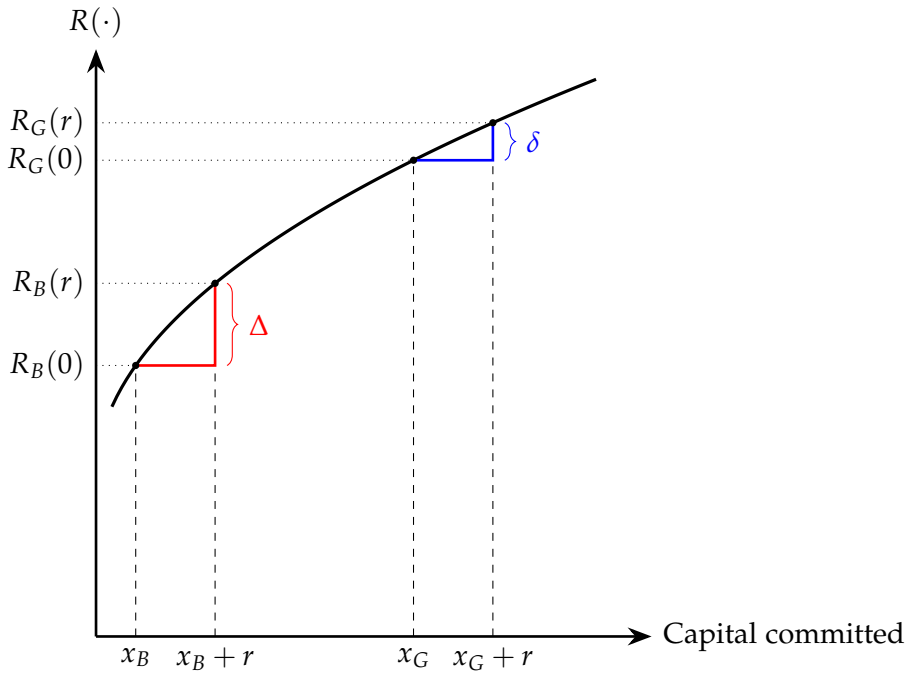


Figure B.1: Diminishing returns to reinvestment

This figure illustrates the concave, diminishing-returns relationship between the intermediate cash flow r and the state-specific payoff increments δ and Δ introduced in Section 3: the same horizontal step r yields a larger rise in the bad state, where the firm starts from a lower point on the curve, than in the good state.