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I Don’t Recall: Information and the Governance Tradeoffs in Securities Lending

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October 2026

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Abstract

Institutional investors are commonly viewed as facing a tradeoff between revenue and voting power when lending shares. However, lending also generates valuable voting information via the borrowing demand of informed short sellers. I develop a model in which lenders trade off revenue, voting power, and information, and derive novel implications for corporate governance. Contrary to conventional wisdom, expected firm value can suffer when lenders recall shares to cast extra votes, since doing so discourages borrowing ex-ante and thereby reduces the informativeness of those votes; the key governance tradeoff is between a larger number of less informed votes and a smaller number of more informed votes. Thus, share lending and voting are not necessarily substitutes - they can also be complementary.

Keywords: Securities lending, voting, corporate governance, institutional investors, short selling

JEL Classification: G34, G23, G14, D83

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October 31, 2026

Abstract

Institutional investors are commonly viewed as facing a tradeoff between revenue and voting power when lending shares. However, lending also generates valuable voting information via the borrowing demand of informed short sellers. I develop a model in which lenders trade off revenue, voting power, and information, and derive novel implications for corporate governance. Contrary to conventional wisdom, expected firm value can suffer when lenders recall shares to cast extra votes, since doing so discourages borrowing ex-ante and thereby reduces the informativeness of those votes; the key governance tradeoff is between a larger number of less informed votes and a smaller number of more informed votes. Thus, share lending and voting are not necessarily substitutes — they can also be complementary.

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1 Introduction

Institutional investors often lend securities to earn extra income on their portfolio holdings. However, from a governance perspective, lending shares comes at a cost: a loss of voting power. Lenders can recall lent-out shares before a vote's record date, but doing so means sacrificing that lending revenue. Policymakers and practitioners widely recognize this tradeoff between lending revenue and voting power; however, there is no consensus on the optimal securities lending policy for institutional investors. The SEC states that "if fund management has knowledge of a material vote with respect to the loaned securities, fund directors should recall the loan in time to vote the proxies," while BlackRock's position is that "in almost all instances...the potential long-term financial value to clients of voting shares would be less than the potential revenue the loan may provide clients."[1]

However, lost in this debate is the insight that lending generates more than revenue: it also produces information. The empirical short-selling literature repeatedly shows that short sellers are informed traders who must borrow shares to execute their trades. Moreover, recent empirical studies by Honkanen (2025), Greppmair et al. (2024), and Chague et al. (2025) demonstrate that borrowing demand conveys useful information to lenders. The first two papers show that lenders exploit this information in their trades, while the third shows that short sellers' brokers pass this information along to other clients.

Thus, if lenders update their beliefs about firm value upon observing borrowing demand, those updated beliefs are relevant not only for their trades but also for their votes. In particular, borrowing demand should convey negative information about the company in question, prompting the lender to cast an anti-management vote. Aggarwal et al. (2015) and Li and Zhu (2023) provide evidence consistent with this channel by demonstrating that high recall activity around a vote's record date is associated with subsequent votes against management.

In this paper, I develop a model to analyze how the information conveyed by the lending

[1]Links for SEC quote and BlackRock quote.

market impacts the relationship between share lending and corporate governance. Specifically, I address whether lending and voting are necessarily substitutes, as is commonly believed, or can be complements. That is, can firm value improve when informed institutional investors do not recall shares to vote? I find that it can: the key tradeoff is between a greater number of less informed votes, when lenders recall, and a smaller number of more informed votes, when they do not. Intuitively, informed short sellers do not borrow when they anticipate the lender recalling shares, eliminating the lending market as a source of information.

My model contains a single firm whose payoff depends on the state of the world and the outcome of a shareholder vote. There are three main stages. First, a lending stage: an informed short seller decides whether to borrow shares from the lender for a fee. The lender sets the fee to maximize his expected terminal wealth, which consists of lending revenue and the value of his shares. The lender updates his beliefs about the state after observing borrowing demand. Second, the trading stage: the short seller submits her order alongside noise traders to a Kyle (1985) market maker. Third, the voting stage: the lender decides whether to recall his lent-out shares ahead of the vote. Recalling shares restores the lender's voting power but sacrifices lending revenue. The voting outcome depends on the votes cast by the lender and other dispersed shareholders.

I now summarize the main results, starting with the lender's fee-setting decision. Unlike most models of securities lending, the lender's objective is not maximizing expected revenue; he also needs to consider how the fee affects the informativeness of his subsequent vote. Lower fees relax short-sale constraints and make the level of borrowing demand more informative about the state. However, doing so also costs the lender revenue. The lender's optimal fee trades off revenue against his need for information, which depends on what other signals he has access to.

Next, the lender decides whether to recall shares. The 1940 Investment Company Act requires U.S. mutual funds to be able to recall shares at will so that they can use those shares to vote.[2] However, whether lenders ultimately prefer the extra votes to the fee revenue is not obvious.

[2]Link to act. The act implies that lenders covered by the Investment Company Act of 1940 (e.g., mutual funds) must have this option in their loan agreements.

Consistent with this tradeoff, the lender will not recall shares whenever fee revenue exceeds the expected increase in the value of his holdings from casting those extra votes. Crucially, short sellers understand the relationship between the fee and the lender's recall decision and will not borrow when the fee is in the recall-inducing range. Thus, if the lender wants to acquire information from the lending market, he cannot set fees too low. This insight results in the lender always choosing fees that enable him to commit not to recall shares.

Finally, we have the lender's voting decision. The lender votes to maximize the expected value of the firm, which depends on a binary state of the world ("high" or "low") and the voting outcome ("change" or "status quo"). The value-maximizing vote is for change in the low state and for the status quo in the high state. The lender's vote then depends on the realization of borrowing demand and a private signal. He always votes for change after lending out shares because borrowing demand is an extremely strong negative signal. The lender's vote after not lending out any shares depends on the relative strengths of the lending market signal and his private signal. The absence of borrowing demand is a weak positive signal, so the lender will vote for the status quo in that situation unless his private signal is sufficiently negative.

The fact that the lender's more informed vote improves firm value forces the short seller to close out her position at a higher price. Thus, all else equal, the lender's vote reduces the short seller's profits. The insight that the feedback effect between short selling and voting serves as a short-sale constraint echoes the main result of Edmans et al. (2015). However, in my setting, the lender internalizes this higher close-out price because he values the short seller's continued participation as a source of information; he therefore lowers fees to compensate the short seller. Consequently, this subsidization can result in expected shorting profits increasing with the degree of value improvement produced by the vote.

I then examine how the lender's decision not to recall shares affects firm value. To do so, I compare equilibrium firm value to a counterfactual in which lenders are forced to recall all shares to vote. In the latter case, no borrowing occurs since short sellers rationally anticipate being recalled;

thus, the lender simply votes in line with his private signal. I find that expected firm value is higher under the lender's equilibrium no-recall strategy unless his private signal is very precise. This result holds even though the lender is the *single most informed voter* in my setting. The fundamental tradeoff for firm value is between the lender casting a smaller number of more informed votes and a larger number of less informed votes. Thus, when the lender is otherwise relatively uninformed, the marginal information gain from not recalling shares dominates the loss of votes, since those extra votes would not create much value. As a result, it is not necessarily good governance for lenders to recall shares to vote.

This analysis also generates new insights for recent developments in shareholder voting. First, the rise of index investing has raised concerns that these passive, diversified funds lack the proper incentives to acquire company-specific voting information (e.g., Kahan and Rock (2020) and Fisch et al. (2020)). However, index funds are major lenders of securities, so they automatically receive a steady flow of such information via their lending activities. Consequently, index funds' role as securities lenders mitigates the harm caused by their lack of incentive to acquire voting information. My main result that firm value can improve when lenders do not recall shares is also particularly relevant for index funds, as they are large voters that lack high-quality private signals.

Second, my framework implies a novel relationship between share lending and the recent trend toward decentralized voting (see Malenko et al. (2025) for an analysis of this trend). When a lender owns a large stake, he is incentivized to lower fees in order to acquire information for voting. But when the lender lacks control over his votes — as under a pass-through voting program — this information is less valuable and fees rise accordingly. Moreover, as voting becomes more decentralized, lenders will be less willing to recall shares, since they have little incentive to sacrifice revenue for votes they cannot cast. Overall, this paper demonstrates that the governance implications of securities lending cannot be fully understood without accounting for the information it generates.

Related Literature

This paper contributes to the growing literature on information spillovers in the securities lending market. Recent empirical work demonstrates that the act of borrowing shares conveys negative information about the firm to share lenders, who then either trade on this information themselves (Honkanen (2025), Greppmair et al. (2024)) or pass it along to others (Chague et al. (2025)). These spillovers have also been explored theoretically in works by Chen et al. (2025), Nurisso (2026), and Pankratov (2020). However, this literature has so far exclusively focused on how lending market information affects financial market outcomes. This paper instead recognizes that lending market information is also valuable for shareholder voting decisions and examines the governance implications thereof.

I also contribute to the literature on the corporate governance implications of securities lending (e.g., Aggarwal et al. (2015); Hu et al. (2020); Li and Zhu (2023)). Typically, this literature has framed share lending and voting as substitutes: lenders trade off extra votes against fee revenue. My analysis instead demonstrates that share lending can complement governance by making the lender's smaller number of votes more informed. To my knowledge, this paper also provides the first formal theoretical analysis of the revenue vs. voting tradeoff in corporate governance. An adjacent literature examines the practice of "empty voting" where shareholders borrow shares to accumulate extra votes (e.g., Hu and Black (2006), Brav and Mathews (2011), Speit and Voss (2020)). This paper takes the opposite approach and focuses on modeling the voting behavior of share lenders rather than borrowers.

This paper also relates to the literature on financial market feedback effects (e.g., Edmans et al. (2015), Bond et al. (2012), Goldstein (2022)) by examining how a securities lender can learn information for a value-relevant shareholder vote by lending shares to informed short sellers. Parlasca and Voss (2025) also examine feedback effects between financial market and voting outcomes, but do not address the specific decisions faced by securities lenders, which is the focus of this work. Kunzmann and Meier (2018) provide evidence for the learning channel emphasized in this paper

	V=0	**V=1**
$\boldsymbol{\theta}$**= h**	$\Pi(h,0)=\pi$	$\Pi(h,1)=\pi-\delta$
$\boldsymbol{\theta}$**= l**	$\Pi(l,0)=0$	$\Pi(l,1)=\delta$

Table 1: Firm value as a function of θ and V

more generally by showing that elevated short interest predicts CEO turnover.

2 Model Setup

There is a single firm that generates some payoff $\Pi(\theta, V)$, where $\theta \in \{l, h\}$ is an exogenous state of the world and $V \in \{0, 1\}$ is the outcome of a vote. I assume the two states of the world are equally likely. I formally define the payoff of the firm in Table 1 where $\pi > 0$ and $\delta \in (0, \frac{\pi}{2})$.

Intuitively, we can interpret $V = 1$ as a vote "for change/against management" and $V = 0$ as a vote for "the status quo/management." In the high state of the world ($\theta = h$) firm value is maximized with a vote for the status quo; conversely, in the low state of the world ($\theta = l$), the optimal vote is for change. Voting for change in the high (low) state lowers (raises) firm value by δ. The assumption that $\delta < \frac{\pi}{2}$ ensures that firm value is always strictly higher in the high state of the world.

The model contains five players: an informed short seller (S) who only appears when $\theta = l$, a securities lender (L), noise traders, dispersed shareholders, and a market maker.[3] The short seller can borrow shares from the lender and, along with the noise traders, trades with the market maker in a Kyle (1985) style financial market. The lender and the dispersed shareholders then vote.

I describe the lending market, financial market, voting procedure, and timeline in more detail below.

[3]The assumption that short sellers only appear when $\theta = l$ is a simplification that is equivalent to a setting in which the short seller always appears but δ is small enough to deter shorting in the high state.

2.1 Lending Market

I model securities lending in the style of Nurisso (2026). The lender is a monopolist who lends shares to the short seller for a per-share fee $f \geq 0$. The lender chooses f to maximize his expected terminal wealth, which consists of the value of his shares plus fee revenue. After the trading stage, the lender can recall shares before the voting stage (i.e., at the record date). If the lender recalls shares, the lender returns the fee, and the short seller must cover the associated short position. For simplicity, I assume the short seller earns zero profit on prematurely covered shorts; one can interpret this outcome as the market becoming perfectly liquid after the main trading stage. Short sellers cover non-recalled shares at the fundamental payoff.

2.2 Stock Market

There is one perfectly divisible share of the firm. The lender owns fraction α, noise traders own λ, and the remaining $1 - \alpha - \lambda$ are owned by dispersed long-term shareholders. Assume noise traders get a liquidity shock with probability one-half, after which they collectively sell their λ stake; otherwise, noise traders do not trade. Thus, the noise traders' order is $O_N \in \{-\lambda, 0\}$.

The short seller has zero shares and therefore must borrow from the lender to short the stock. To ensure the short seller can borrow enough shares to mimic the noise traders' trading quantity, I assume $\alpha \geq \lambda > 0$. Thus, the short seller demands $O_S \in \{-\lambda, 0\}$. The lender and the dispersed long-term shareholders do not trade.

I assume the short seller is perfectly informed about the state when she appears and has some random cost of trade c that is uniformly distributed over the interval $[0, \bar{C}]$. To establish a clear counterfactual benchmark, I follow the approach in Nurisso (2026) and normalize $\bar{C}$ as follows:

Assumption 1. *$\bar{C}$ equals the maximum opportunity cost that could support the short seller selling in the counterfactual where she is instead endowed with λ shares and there is no governance problem (i.e., $\delta = 0$).*

Thus, c alone is not enough to deter the short seller from trading; it only does so when combined

with lending frictions and governance feedback effects. My main results do not depend on this parameter restriction, but it makes the model more tractable and easier to interpret.[4] I also conjecture that the short seller trades according to a threshold rule and shorts the stock if and only if $\theta = l$ and $c < c^*$.

A market maker observes the aggregate order flow $O \equiv O_S + O_N$ and sets the price equal to the expected payoff conditional on that order flow: $P(O) \equiv E[\Pi|O]$. The market maker does not observe developments in the lending market—though it does have correct-in-equilibrium expectations about the short seller's equilibrium borrowing strategy.

2.3 Voting

The lender rationally votes to maximize his expected terminal wealth. If the lender lent out λ shares and recalled $r \in [0, \lambda]$, he has $\alpha - \lambda + r$ votes; if he did not lend out any shares, then the lender has α votes. The dispersed long-term shareholders always have $1 - \alpha - \lambda$ votes because they do not trade. I assume that all shares not held by the lender or the dispersed shareholders on the record date (i.e., shares currently held by noise traders or the market maker) are not voted.[5] I also assume the lender's stake is not large enough to determine the outcome unilaterally. This restriction, combined with my previous assumption that $\alpha \geq \lambda$ implies the following:

Assumption 2. $\lambda \leq \alpha < \frac{1-\lambda}{2}$

The lender also observes a private signal $\sigma \in \{h, l\}$ at the voting stage where $\Pr[\sigma = \theta|\theta] = \phi \in [0.5, 1]$. The case where $\phi = 0.5$ represents the case where the private signal is uninformative, and $\phi = 1$ represents the case where the private signal perfectly reveals the state. I assume the

[4] For example, if $\bar{C}$ is very small, short sellers nearly always sell regardless of lending market conditions, and if $\bar{C}$ is very large, the expected amount of short selling is always approximately zero. The normalization provided in Assumption 1 ensures that there will be meaningful variation in borrowing demand as lending market conditions change—though its specific level does not impact any of the results. See Lemma A1 in the appendix for more details on the derivation of $\bar{C}$.

[5] See works by Levit et al. (2024); Bar-Isaac and Shapiro (2020);Brav and Mathews (2011); and Meirowitz and Pi (2022) for analyses of market participants who simultaneously trade and vote.

realization of σ is the lender's private info, but its quality, ϕ, is common knowledge. I focus on pure strategies for the lender vote and assume that, if indifferent, he votes for the status quo.

A simple majority rule determines the voting outcome. The votes cast by the dispersed shareholders are random; specifically, I assume the *proportion* of votes cast by the dispersed shareholders in favor of change is uniformly distributed on $[0, 1]$. Denote the random variable representing this dispersed voting outcome as d. I consider the case in which dispersed shareholders also rationally learn from public information in Section 4.1.

2.4 Timing

1. The state θ is generated. If $\theta = l$, the short seller appears.
2. **Lending Market:**
   (a) The lender sets the lending fee f.
   (b) The short seller (if she appears) decides whether to borrow at fee f.
   (c) The lender learns whether his shares were borrowed and updates his belief about the state.
3. **Trade:** Noise traders and the short seller submit their orders to the market maker. $P(O)$ is generated and publicly announced.
4. **Record Date:** The lender decides whether to recall his lent-out shares. If shares are recalled, the short seller covers them at price $P(O)$.
5. **Vote:** The lender receives his private signal σ. The lender and the dispersed shareholders cast their votes and voting outcome V is determined.
6. The fundamental payoff $\Pi(\theta, V)$ is revealed. All remaining short positions close at this fundamental value.

3 Model Solution

3.1 Lender's Vote

I solve the model backward, starting with the lender's voting decision. The lender's vote depends on the lending market outcome and the realization of his private signal. Denote the outcome where the short seller borrowed shares as $b = 1$ and the outcome where the short seller does not borrow as $b = 0$. The lender's voting information set excludes the price because, conditional on b, the price conveys no additional information. The lender will vote for change if and only if

$$E[\Pi(\theta, 1)|b, \sigma] > E[\Pi(\theta, 0)|b, \sigma] \iff Pr[\theta = h|b, \sigma] < \frac{1}{2} \tag{1}$$

Equation (1) states that the lender votes for change if his belief that the state is high is below one-half. Given the conjecture that the short seller only borrows when $\theta = l$ and her random trading cost c is below some threshold, we can characterize this posterior probability as follows

$$\begin{aligned} &Pr[\theta = h|b = 1] = 0 < 0.5 \\ &Pr[\theta = h|b = 0, \sigma = h] = \frac{\phi}{\phi + (1 - B(f))(1 - \phi)} > 0.5 \\ &Pr[\theta = h|b = 0, \sigma = l] = \frac{(1 - \phi)}{(1 - \phi) + (1 - B(f))\phi} \end{aligned} \tag{2}$$

where $B(f)$ is the probability that the short seller borrows in the low state of the world given fee f. These posteriors imply that the lender will vote for change when $b = 1$ and will vote for the status quo when $b = 0$ and he receives a positive private signal ($\sigma = h$). These votes are intuitive: since the short seller only shorts the stock in the low state, borrowing demand is a strong negative signal, inducing the lender to vote for change regardless of his private signal. Moreover, since borrowing demand is a negative signal, the absence of borrowing demand must be a positive signal. Thus, the lender's positive private signal complements this positive lending market signal, making a vote for

the status quo optimal.

The lender's optimal vote when he does not lend any shares and receives a negative private signal depends on the strength of that signal. Intuitively, the stronger the negative signal, the more likely the lender is to vote for change. We can rearrange this probability to state that the lender will vote for change in this situation if and only if

$$\Delta(f) \equiv \frac{\phi}{1-\phi}(1 - B(f)) - 1 > 0$$

The $\frac{\phi}{1-\phi}$ term represents the strength of the lender's private signal: as ϕ increases, the lender is more inclined to ignore the lending market signal b and vote according to his negative private signal. The $1 - B(f)$ term measures the strength of the lending market signal $b = 0$. Observe that the short seller does not borrow for one of two reasons: (I) the state is high, or (II) the state is low but shorting is too costly. Thus, as shorting becomes more costly (i.e., $B(f)$ declines), it is more likely that motivation (II) is behind the short seller's decision not to borrow, indicating that the state is likely low and that the lender should vote for change. Notation-wise, denote the lender's vote in this situation as

$$v_L = \begin{cases} 1 \text{ if } \Delta(f) > 0 \\ 0 \text{ if } \Delta(f) \leq 0 \end{cases} \tag{3}$$

I now address how the lender's vote impacts the voting outcome. Suppose the lender has lent out λ shares to the short seller. By recalling the λ shares, the lender can cast his maximum α votes; if he does not recall any, he can only cast $\alpha - \lambda$. Denote the number of recalled shares as $r \in [0, \lambda]$. Since the lender always votes for change after lending out shares, the voting outcome will be for change ($V = 1$) whenever

$$(\alpha - \lambda + r) + d(1 - \alpha - \lambda) > (1 - d)(1 - \alpha - \lambda) \iff d > \frac{1}{2}\left(1 - \left(\frac{\alpha - \lambda + r}{1 - \alpha - \lambda}\right)\right) \tag{4}$$

where d is the proportion of change votes coming from dispersed shareholders. In the analysis to follow, it will be convenient to define the probability that the voting outcome is for change when the lender votes all of his shares as $\overline{G} \equiv \frac{1}{2} + \frac{1}{2}\left(\frac{\alpha}{1-\alpha-\lambda}\right)$ and the same probability when the lender does not recall any shares as $\underline{G} \equiv \frac{1}{2} + \frac{1}{2}\left(\frac{\alpha-\lambda}{1-\alpha-\lambda}\right)$. More generally, one can define the probability that the vote is for change as a function of the number of shares the lender recalls as $G(r) = \frac{1}{2} + \frac{1}{2}\left(\frac{\alpha-\lambda+r}{1-\alpha-\lambda}\right) \in [\underline{G}, \overline{G}]$.

We can then derive a similar expression for the likelihood that the vote is for change when the lender does not lend out any shares. Observe that the lender always casts all α votes in this circumstance. When the lender gets a positive signal $\sigma = h$, he always votes for the status quo. Then, the voting outcome will be for change when

$$d(1-\alpha-\lambda) > (1-d)(1-\alpha-\lambda) + \alpha \iff d > \frac{1}{2}\left(1 + \left(\frac{\alpha}{1-\alpha-\lambda}\right)\right) \tag{5}$$

Thus, the probability that the voting outcome is for change is $\frac{1}{2} - \frac{1}{2}\left(\frac{\alpha}{1-\alpha-\lambda}\right) = 1 - \overline{G} < 0.5$.

Conversely, when the lender receives a negative signal after no loan agreement, his optimal vote depends on the strength of that signal (see Equation (3)). If the lender ultimately decides to vote for change ($v_L = 1$), the voting outcome will be for change with probability $\overline{G}$; if the lender votes for status quo ($v_L = 0$), the voting outcome will be for change with probability $1 - \overline{G}$.

3.2 Recall Decision

Next, consider the lender's recall decision after making a loan. Recalling an additional share increases the expected terminal value of the lender's holdings by $\alpha\delta G'(r) = \frac{\alpha\delta}{2(1-\alpha-\lambda)}$, but costs the lender f in fee revenue. Observe that neither the marginal benefit nor the marginal cost of recalling shares depends on the number of shares recalled r. Thus, the lender will recall all shares when the fee is less than the $\alpha\delta G'(r)$ and no shares otherwise. I formalize this insight in the following lemma.

Lemma 1. *The lender will recall $r \in \{0, \lambda\}$ shares. He recalls all his shares when $f < \frac{\alpha\delta}{2(1-\alpha-\lambda)}$, and 0 otherwise.*

The comparative statics for the recall decision are intuitive. The minimum fee required for the lender not to recall shares is

$$\underline{f} \equiv \frac{\alpha\delta}{2(1-\alpha-\lambda)} \tag{6}$$

This minimum fee is increasing in: (i) the size of the lender's stake (α), (ii) the number of extra votes he gets by recalling (λ), and (iii) the governance benefit (δ).

The idea that the lender will not recall shares when lending revenue is sufficiently high is natural and consistent with the prevailing wisdom of policy makers and practitioners: foregone lending revenue is widely seen as the main opportunity cost of recalling shares to vote. However, an implication of (6) is that, upon observing the fee, the short seller can foresee whether the lender will ultimately recall the shares. Thus, the short seller will not attempt to borrow whenever the fee is below $\underline{f}$. This insight parallels that of Nurisso (2026)—where short sellers do not borrow when they expect their securities lender to recall shares for trading purposes.

Lemma 2. *The short seller will not borrow whenever the fee is less than $\underline{f}$.*

3.3 Prices

We can now move to the prices. If the market maker conjectures that $f^* < \underline{f}$, then the order flow will be uninformative, and prices will always equal the unconditional expected value of the firm. Suppose instead the market maker conjectures that $f^* \geq \underline{f}$. Prices will then equal

$$P(O) = \begin{cases} \frac{\pi - B(f^*)\delta(1-\overline{G})}{2-B(f^*)} + v_L^* \left(\frac{(2\overline{G}-1)(1-\phi)\delta}{2-B(f^*)} \right) \Delta(f) \text{ when } O = 0 \\ \frac{1}{2}\big(\pi + \delta B(f^*)(\overline{G} + \underline{G} - 1)\big) + v_L^* \left(\frac{(2\overline{G}-1)\delta(1-\phi)}{2} \right) \Delta(f) \text{ when } O = -\lambda \\ \underline{G}\delta \text{ when } O = -2\lambda \end{cases} \tag{7}$$

where stars denote the market maker's beliefs. The outcome $O = 0$ reveals to the market maker that no shares were borrowed, the outcome $O = -\lambda$ is uninformative, and the outcome $O = -2\lambda$ reveals that the short seller shorted the stock. Then, given some fee $f \geq \underline{f}$, the shorting threshold is determined by the following condition:

$$c(f) = \max\left(\lambda\left[E[P|O_S = -\lambda] - \delta\underline{G} - f\right], 0\right) \tag{8}$$

The first term in the max operator represents the short seller's per share shorting profits (sale price minus close-out price minus the fee) multiplied by the number of shares shorted. From this condition, we then get $B(f) = \max(\frac{c(f)}{\bar{C}}, 0)$.[6] Observe that both the lender and speculator take prices as given when lending, since the market maker does not observe lending market outcomes. Thus, as one might expect, the probability of a short sale is decreasing in the lending fee.

3.4 Fee Choice

Next, we can move back to the lender's optimal fee choice. The lender effectively has two options: (I) set a fee below $\underline{f}$ and attract no short sellers, or (II) choose the optimal $f \geq \underline{f}$.

When the lender chooses $f < \underline{f}$, he attracts no short sellers and therefore loses out on the lending market signal b. Thus, the lender will vote according to his private signal σ with all of his shares. His expected terminal wealth is:

$$\alpha(\frac{\pi}{2} + \frac{\delta}{2}[(2\phi - 1)(2\overline{G} - 1)]) \tag{9}$$

This expected wealth is increasing in both the informativeness of the lender's signal ϕ and the probability that the vote goes his way $\overline{G}$.

[6] I show in Lemma A2 in the Appendix that $c(f) < \bar{C}$ for all $f \geq 0$.

The lender's optimal fee that allows him to commit not to recall shares solves

$$\max_{f \geq \underline{f}} \frac{B(f)\lambda f}{2} + \frac{\alpha}{2}\Big[\pi + \delta B(f)(\overline{G} + \underline{G} - 1) + v_L(2\overline{G} - 1)\delta(1-\phi)\Delta(f)\Big] \tag{10}$$

The first term corresponds to the lender's expected lending revenue, and the second term corresponds to the expected terminal value of the lender's shares. Observe that the lender's economic interest in the firm remains α regardless of whether he lends out shares, since the short seller ultimately returns all of them.

Lemma 3. *Let $\tilde{\phi} \equiv (\overline{G}+\underline{G}-1)/(2\overline{G}-1) = 1-\lambda/(2\alpha)$. The expected terminal value of the lender's shares is decreasing in the fee if $v_L = 0$ or $\phi < \tilde{\phi}$, and increasing in the fee if $v_L = 1$ and $\phi > \tilde{\phi}$. Both relationships are strict if $B(f) > 0$.*

Lemma 3 highlights the novel informational role of securities lending for governance. The lender learns valuable information about the optimal vote by lending shares to informed short sellers. Thus, when elevated fees prevent these informed traders from borrowing, the lender is more likely to vote incorrectly, reducing the expected value of his holdings. A loan, however, also costs the lender λ votes, and loans occur only in the low state, where a vote for change raises firm value. When $v_L = 1$ and his private signal is precise ($\phi > \tilde{\phi}$), this loss of votes outweighs the information gain, so the value of his shares rises with the fee. When $B(f) = 0$, short selling does not occur, so the fee has no marginal effect on the value of his shares.

Solving for the optimal fee gives us:

$$f^* = \max\left(\frac{E[P|Os=-\lambda] - \delta\underline{G}}{2} - \frac{\alpha\delta}{2\lambda}\left[\overline{G} + \underline{G} - 1 - v_L\phi(2\overline{G}-1)\right], \underline{f}\right) \tag{11}$$

For notational convenience, define $\hat{f}(v_L) \equiv \frac{E[P|Os=-\lambda]-\delta\underline{G}}{2} - \frac{\alpha\delta}{2\lambda}\left[\overline{G} + \underline{G} - 1 - v_L\phi(2\overline{G}-1)\right]$. Thus, the lender's fee choice is $f^* = \max(\hat{f}(v_L), \underline{f})$.

The first term in $\hat{f}(v_L)$ represents the revenue-maximizing fee. Observe that it equals one-half of the short seller's expected selling profits. The second term in $\hat{f}(v_L)$ represents the discount from

the revenue-maximizing fee that the lender grants for information acquisition purposes. Suppose first that $v_L = 0$. The discount increases in $\overline{G}$ and $\underline{G}$ because it is then more likely that this lending-market information will affect the voting outcome. Put differently, the lender is willing to sacrifice revenue for information to the extent that it can influence the voting outcome. Now suppose $v_L = 1$, so the second term in the discount (i.e., $\phi(2\overline{G} - 1)$) comes into play. This term reduces the discount the lender charges because he relies less on the lending market signal for his voting decision. That is, when $v_L = 1$, the lender sometimes votes against what the lending market signal recommends because his private signal suggests the opposite. When $\phi > \tilde{\phi}$, the discount becomes a premium: the lender charges more than the revenue-maximizing fee because borrowing now costs him more in votes than it yields in information.

We can then plug f^* into the lender's objective function to see when he prefers recalling shares to vote. Specifically, the lender will prefer recalling shares whenever (9) exceeds the objective function given in (10) evaluated at $f = f^*$.

Lemma 4. *The lender's expected profits are strictly higher when he does not recall shares.*

Lemma 4 may seem surprising at first glance. In particular, one might have expected the lender to be more willing to recall shares as his private signal becomes more precise. After all, if the lender's private signal is sufficiently strong, the informational benefits of share lending are small. However, the intuition becomes clear once one recognizes that there are two ways for the lender to attract zero borrowing demand: (I) set a fee below $\underline{f}$ so that he can no longer commit not to recall shares, and (II) set a prohibitively high fee. The lender's expected profits equal (9) in either case. However, the lender always has the option to set a prohibitively high fee in the optimization problem given by (10), so the fact that he prefers a fee that attracts short selling (otherwise there would be no recall decision to make) implies that his expected profits are higher when he commits not to recall shares.

Another way to understand Lemma 4 is that the downside of not recalling shares is having fewer votes. However, $\underline{f}$ is defined precisely to equal the expected reduction in the value of the lender's

holdings from not utilizing all of his votes. So since $f^* \geq \underline{f}$, the downside from having fewer votes is made up for via higher fees. [7]

3.5 Equilibrium Characterization

Given that the lender must always commit not to recall shares, his optimal fee is given by (11). We can therefore characterize an equilibrium by the lender's fee f^* and his equilibrium voting choice after not making a loan and receiving a negative private signal v_L^*. Thus, we can find all equilibria by testing each of the four possible equilibrium pairs (v_L^*, f^*) where $v_L^* \in \{0, 1\}$ and $f^* \in \{\hat{f}(v_L^*), \underline{f}\}$. That is, given a candidate equilibrium pair, we can calculate the resulting $B(f^*)$, and then verify whether the proposed fee and voting choice are optimal.

Proposition 1. *There are four equilibria to this game: (i) The lender votes $v_L^* = 0$ and sets fee $f^* = \hat{f}(0)$, (ii) the lender votes $v_L^* = 0$ and sets fee $f^* = \underline{f}$, (iii) the lender votes $v_L^* = 1$ and sets fee $f^* = \hat{f}(1)$, and (iv) the lender votes $v_L^* = 1$ and sets fee $f^* = \underline{f}$. For some parameter values, multiple equilibria coexist: equilibria (i) and (iii) can occur simultaneously, as can equilibria (ii) and (iii).*

As Equation (3) implies, the lender will vote for change following no loan agreement ($b = 0$) and a negative private signal ($\sigma = l$) when that private signal is sufficiently strong (i.e., ϕ is large). However, there is also a region of ϕ where both voting for and against change are equilibrium strategies. To understand this multiplicity of equilibria, recall from the discussion following Lemma 3 that the lender charges a higher fee when $v_L = 1$ since lending market information is less influential for his vote. As a result, $B(f^*)$ will be lower, making $\Delta(f)$ more likely to be positive for any given ϕ. Intuitively, the lender votes for change in this situation because his negative private signal is sufficiently stronger than his positive lending market signal. Thus, his vote for change is, to some extent, self-fulfilling, as the associated higher fee reduces short selling, making $b = 0$ a less positive

[7] See Section 4.3 for further discussion of this result.

signal. Conversely, the lender lowers fees if he votes for the status quo in this situation, which helps support that voting choice.[8]

Whether the lower bound on the lender's fee binds depends on how important his extra votes are. To see this, let us return to our decomposition of $\hat{f}(v_L)$ into the revenue-maximizing fee and an information acquisition discount. The lower bound is then more likely to bind (i.e., $\hat{f}(v_L) < \underline{f}$) when the discount is large, which occurs when the governance benefits from information acquisition are particularly valuable. Thus, the discount will then be greater when $v_L = 0$ (because in that case the lender's vote is determined by the lending market signal), his stake α is large, the impact of the vote on firm value δ is large, and the amount of foregone votes by not recalling shares λ is small.

I provide a numerical example of the equilibrium regions as a function of the lender's private signal quality ϕ and the governance parameter δ in Figure 1. Starting on the left side of the graph, where ϕ is low, we see that the lender always votes $v_L^* = 0$ regardless of the realization of his private signal. In other words, the positive "no loan agreement" signal dominates the lender's weak private signal. Then, as δ increases, the lender's fee choice eventually becomes constrained by the lower bound $\underline{f}$. This result occurs because a higher value of δ implies greater benefits from voting correctly. As a result, the lender ideally wants to set very low fees to acquire more information, but these lower fees also weaken his commitment not to recall shares. Thus, as δ gets sufficiently large, the lender's fee hits the lower bound $\underline{f}$.

Then, as we move to the right (i.e., as ϕ increases), we become more likely to have an equilibrium where the lender votes $v_L^* = 1$; that is, he votes for change following a negative signal even if he does not lend out any shares. This result occurs because, as the lender's private signal quality increases, it becomes increasingly optimal to follow its recommendation and ignore the lending market. However, when ϕ is in an intermediate region (e.g., $\phi = 0.75$), all four equilibria are possible, including multiple occurring at the same time. I outlined why multiple equilibria can

[8]We never transition directly from (i) to (iv) as ϕ increases since $\hat{f}(0) < \hat{f}(1)$, and there is no multiplicity as we transition from (ii) to (iv) since the fee is unchanged. See the proof for more details.

occur earlier, so I will instead focus on the transitions between regions.

When δ is low, the lender will charge a fee close to the revenue-maximizing level because the gain from casting the correct vote is very small. This relatively high fee makes the lending signal less informative, incentivizing the lender to have $v_L^* = 1$. Thus, we see equilibrium region (iii) from Proposition 1 when δ is very low. As δ increases, the lender is willing to grant a larger fee discount to acquire information. This lower fee increases the strength of the lending market signal, encouraging the lender to disregard his private information and vote $v_L^* = 0$ (i.e., equilibrium (i)). However, as δ rises further, the lender's optimal fee will eventually hit the lower bound $\underline{f}$, resulting in equilibrium (ii). We then return to equilibrium (iii) as δ increases further because the lender is no longer able to compensate the short seller for a higher close-out price with lower fees. Thus, the probability of a short sale declines, making the lending market signal less informative and $v_L^* = 1$ the optimal vote. Finally, we move to equilibrium (iv) as δ reaches its highest level. Again, the lender wants to lower fees to acquire better information (though to a lesser extent since $v_L^* = 1$), and eventually the lower bound binds once more.

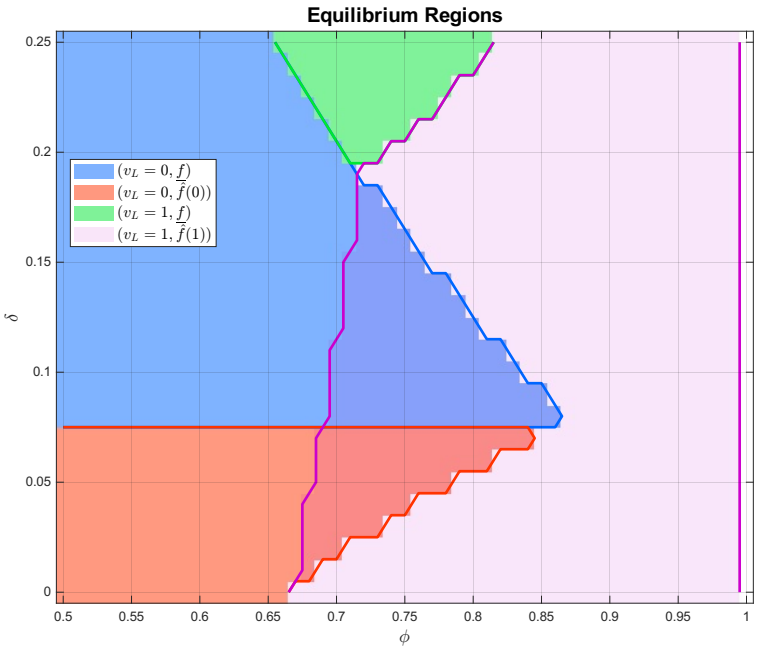
Finally, when the lender's private signal is very informative, the lender always votes $v_L^* = 1$. Whether his fee hits the lower bound depends on the specific parameters; in Figure 1, it turns out that equilibrium (iii) is the unique equilibrium when ϕ is close to 1. Though for other parameterizations, equilibrium (iv) can exist for high values of δ for reasons previously described.

Next, let us consider how short selling profits change as the governance parameter δ increases.

Proposition 2. *When $f^* = \hat{f}(v_L)$, short-selling profits can be increasing or decreasing in δ. When $f^* = \underline{f}$, short selling profits are decreasing in δ.*

Suppose $f^* = \hat{f}(v_L)$. Proposition 2 states that even though the feedback effect between lending and governance increases the short seller's expected covering price $\underline{G}\delta$, short-selling profits can still increase in δ. This result stands in contrast to Edmans et al. (2015), who find that short-selling profits decrease when there is a feedback effect between short selling and real decision-making. In that paper, the authors develop a feedback model in which a manager learns from his stock price to

Figure 1: Equilibrium Regions Given ϕ and δ



This figure sets $\pi = 1$, $\alpha = 0.3$, and $\lambda = 0.05$.

make better decisions. The authors show that the manager's intervention endogenously increases short-sale constraints.

To summarize their mechanism, short sellers learn that the state of the world is "bad," so they sell and drive down the stock price. The manager infers the state from the stock price and makes a value-enhancing decision. This increase in firm value harms short sellers, as they must close out their positions at a higher price.

The main difference between Proposition 2 and Edmans et al. (2015) concerns the determination of lending fees. In their paper, the lending fee is exogenous, and the firm's manager takes the action without any direct interaction with the short seller—which is a sensible assumption in that setting. However, when the decision maker (i.e., a major voter) is a securities lender, he can interact with the short seller and compensate her for the higher expected covering price with lower fees. The

lender may be willing to sacrifice this lending revenue because doing so enables him to extract more information from the lending market and thereby improve the value of his shares.

Nevertheless, whether fees decline by enough to improve shorting profits depends on the lender's voting power and strategy. For example, as I will demonstrate in Section 4.1, short-selling profits strictly increase in δ when the voting outcome is completely determined by the realization of the lending market signal (e.g., when $\overline{G} = \underline{G} = 1$ and $v_L^* = 0$). More generally, the lender is more willing to compensate the short seller with lower fees when lending market information heavily influences his vote ($v_L^* = 0$) and when his vote is more likely to be pivotal ($\overline{G}, \underline{G}$ are high).

The possibility of short-selling profits increasing in δ crucially depends on the lender's ability to lower fees, so when fees are stuck at the lower bound of $f^* = \underline{f}$, short-selling profits must instead fall.

Figure 2: Equilibrium Short Selling Profits

This figure sets: $\pi = 1, \phi = 0.5, \alpha = 0.3$, and $\lambda = 0.2$.

Figure 2 illustrates the intuition for this proposition. The blue line on the left plot represents the speculator's equilibrium per-share *selling* profits: $E[P|O_S = -\lambda] - \underline{G}\delta$. Consistent with the Edmans et al. (2015) result, this line is decreasing in δ. However, we see that the fee (represented

by the orange line) also initially decreases in δ—and more steeply. Thus, equilibrium short-selling profits (the difference between the blue and orange lines) increase with δ (right plot) until we reach the point where $\hat{f}(0)$ equals $\underline{f}$.[9] From that point onward, short-selling profits decrease because the lender can no longer compensate the short seller with lower fees.

3.6 Firm Value

Next, let us examine how the lender's decision never to recall shares affects firm value. I focus on the case where the equilibrium $c^* > 0$; otherwise, the recall decision is moot. According to Lemma 4, the lender never recalls shares because higher fee revenue compensates him for the loss of votes. Many commentators recognize that lenders may not find it privately optimal to recall their shares, but maintain that this conscious tradeoff of governance for lending revenue diminishes firm value at the expense of other shareholders who bear the costs without any of the upside. However, before drawing such a conclusion, we need to consider how the lender's recall decision affects short sellers' ex-ante borrowing incentives.

Consider a policy that forces lenders to recall all their shares to vote. Then, short sellers will anticipate this recall decision and not borrow in the first place. Equation (9) then implies that expected firm value equals

$$E[\Pi|\text{recall}] = \frac{1}{2}(\pi + \delta[(2\phi - 1)(2\overline{G} - 1)]) \tag{12}$$

On the other hand, when the lender follows his optimal policy of not recalling shares, expected firm value will equal

$$E[\Pi|\text{no recall}] = \frac{1}{2}\left[\pi + \delta B(f^*)(\overline{G} + \underline{G} - 1) + v_L^*(2\overline{G} - 1)\delta(1 - \phi)\Delta(f^*)\right] \tag{13}$$

where f^* and v_L^* are the lender's equilibrium fee choice and voting strategy. Can firm value ever be

[9] $v_L^* = 0$ in this example since $\phi = 0.5$.

greater when the lender does not recall shares? In general, the answer is yes: expected firm value will be higher when the lender does not recall shares as long as his private signal is not too precise. To see this, consider the two extreme cases: $\phi = 0.5$ and $\phi = 1$. Suppose first that $\phi = 0.5$ (i.e., the lender's private signal is uninformative). Then, Equations (12) and (13) simplify to

$$E[\Pi|\text{recall}, \phi = 0.5] = \frac{\pi}{2} < \frac{\pi + \delta B(f^*)(\underline{G} + \overline{G} - 1)}{2} = E[\Pi|\text{no recall}, \phi = 0.5]$$

Essentially, the lender has more votes when he recalls shares, but those votes are uninformed since he is no longer learning from the lending market and has noisy private information. Thus, firm value improves when he does not recall shares since doing so grants him the lending market signal b.[10] Of course, the loss of lending market information becomes less detrimental when the lender has access to other sources of information. Let us now consider the polar opposite case where the lender's private signal is perfectly informative ($\phi = 1$).

$$E[\Pi|\text{recall}, \phi = 1] = \frac{1}{2}(\pi + \delta(2\overline{G} - 1)) >$$
$$\frac{1}{2}(\pi + \delta(2\overline{G} - 1) - \delta B(f^*)(\overline{G} - \underline{G})) = E[\Pi|\text{no recall}, \phi = 1]$$

In this case, not recalling shares yields no information advantage, so the firm's value must suffer since the lender has fewer votes. Nevertheless, it is still not optimal for the lender to recall shares in this case because he is compensated for this value destruction with higher lending revenue.

The fundamental tradeoff for firm value is between a larger number of less informed votes and a smaller number of more informed votes, and which side of the tradeoff prevails depends on the quality of the lender's other, non-lending market, information. When the lender is otherwise uninformed, the smaller number of more informed votes is the value-improving option. However, the opposite conclusion holds when the lender's private signal is very precise because the information loss from recalling shares shrinks. I formalize this intuition in the following proposition.

[10] Observe that the lender optimally chooses $v_L^* = 0$ when $\phi = 0.5$.

Proposition 3. *Expected firm value is higher when the lender does not recall shares to vote whenever ϕ is sufficiently small.*

While a few other papers have implied that not recalling shares may improve firm value, the conjectured mechanism involves those shares being voted by other, more informed voters (e.g., Christoffersen et al. (2007), Brav and Mathews (2011), Speit and Voss (2020)). In other words, the lender effectively delegates their votes to a better-informed borrower via the securities lending market. Proposition 3 makes a stronger statement: expected firm value can increase when the lender does not recall shares to vote *even when the lender is the most informed voter*. In fact, the lender is not just the most informed voter in my model, but is also the only value-maximizing voter.

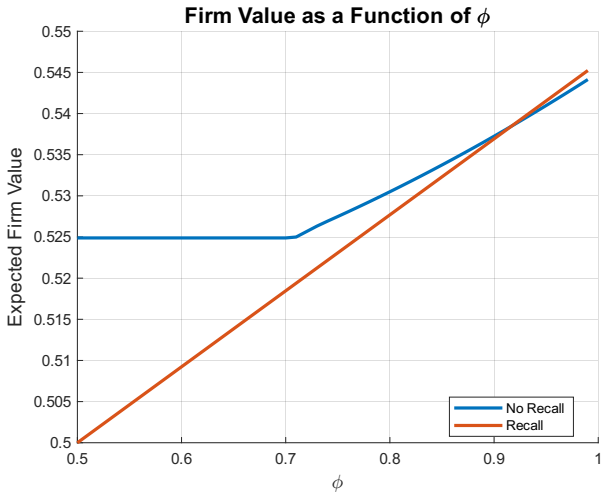
This result also does not rely solely on cases in which the lender's private signal is close to uninformative. Consider the following example with $\pi = 1$, $\alpha = 0.3$, $\delta = 0.2$, and $\lambda = 0.05$. In words, this is a scenario in which the lender owns 30% of the firm, lends out one-sixth of his shares (5% of the total), and faces an upcoming vote that could change the firm's value by 20%. I plot expected firm value when the lender follows his equilibrium no-recall strategy (blue line) and when he is forced to recall shares (orange line) in Figure 3.[11]

Figure 3 demonstrates that firm value improves with a policy of recalling shares only when the lender's private signal is over 90% accurate (specifically, when $Pr[\sigma = \theta|\theta] > 0.917$). Thus, recalling shares is the optimal governance strategy only when the lender's private signal is of very high quality. These different policies can also have a large impact on expected firm value. Consider the case where the difference between the two lines is greatest: when $\phi = 0.5$. Here, expected firm value is 5% higher when the lender follows his equilibrium strategy of not recalling shares to vote. On the other hand, the largest gap in expected firm value when recalling shares is optimal occurs when $\phi = 1$, in which case firm value is only 0.22% higher.[12] Thus, Proposition 3 implies that recalling shares to vote is not necessarily "good governance," as not recalling shares can result in

[11] When there are multiple equilibria, I only plot the one where the lender chooses $v_L^* = 0$ for visual clarity. The kink in the blue line occurs when $v_L^* = 0$ can no longer be supported as an equilibrium voting strategy.

[12] $\frac{0.525-0.5}{.5} = 5\%$ in the first case and $\frac{0.54615-0.54495}{0.54495} \approx 0.22\%$ in the second.

Figure 3: Equilibrium Firm Value



This figure sets $\pi = 1$, $\alpha = 0.3$, $\delta = 0.2$, and $\lambda = 0.05$.

the lender making a more informed vote with his remaining shares.

4 Extensions and Discussion

4.1 Dispersed Shareholders Learn

In the baseline model, I assumed the dispersed shareholders voted randomly. Let us now relax that assumption and allow the dispersed voters to rationally vote to maximize expected firm value conditional on all public information. At the voting stage, public information consists of the stock price $P(O)$ and borrowing demand b. [13] I assume that, if indifferent, the dispersed voters continue their random voting strategy from the baseline model. Thus, conditioning on these two sources of information, the dispersed voters face the same voting problem as the uninformed lender in the baseline model, and therefore vote for change when $b = 1$ and for the status quo otherwise.

[13] I assume that borrowing demand becomes public after the trading stage but before the vote; otherwise, the short seller could never make profits shorting. One can interpret viewing the lending market signal b before the vote as akin to observing short interest, which is observable to market participants (with a lag).

Because Assumption 2 implies the dispersed shareholders hold more votes than the lender, their collective choice now determines the voting outcome. That is, the voting outcome will be for change when $b = 1$ and for the status quo when $b = 0$. This result implies that the lender's equilibrium voting strategy has no impact on firm value. His fee-setting problem then becomes

$$\max_{f \geq 0} \frac{B(f)\lambda f}{2} + \frac{\alpha}{2}\Big[\pi + \delta B(f)\Big]$$

The optimal fee is then

$$f^* = \max\left(\frac{E[P|O_S = -\lambda] - \delta}{2} - \frac{\alpha\delta}{2\lambda}, 0\right) \tag{14}$$

First, taking the price as given, observe that the lender optimally sets a lower fee than in the baseline model (Equation (11)). This is because lending market information is now maximally valuable, since the realization of b determines the voting outcome—though now through the dispersed shareholders votes rather than through the lender's own. One can think of this outcome as the lender subsidizing a public signal. Furthermore, the lender never has a desire to recall shares since his vote is never pivotal.

The increased potency of lending market information then strengthens the result in Proposition 2.

Proposition 4. *Expected short-selling profits are increasing in δ when $f^* > 0$ and decreasing otherwise.*

Relative to Proposition 2, Proposition 4 now states that short-selling profits are always increasing in δ when the lower bound on the lender's fee choice does not bind (as opposed to just under some parameters). Intuitively, the lender is willing to more aggressively cut fees to compensate the short seller for her higher expected close-out price since lending market information has a more direct impact on firm value.[14]

[14]This extension is equivalent to the case where $\overline{G} = \underline{G} = 1$ and $v_L^* = 0$, as I alluded to in the discussion following Proposition 2.

We can also re-examine the implications for expected firm value along the lines of Proposition 3. Recall that this proposition essentially states that there is a cutoff level for the private signal's quality $\phi^\star \in (0.5, 1)$ such that, for all $\phi < \phi^\star$, expected firm value is greater when the lender does not recall shares. In particular, this proposition implies that expected firm value is always strictly higher when a perfectly informed lender recalls shares. That conclusion no longer necessarily holds in this extension.

Proposition 5. *Suppose $\phi = 1$, so the lender is perfectly informed at the voting stage. Expected firm value is greater when the lender does not recall shares whenever $B(f^*) > 2\overline{G} - 1$.*

When the lender recalls shares to vote, the stock price and lending market signal are uninformative because no informed short sellers borrow. Thus, the dispersed shareholders continue to vote randomly like in the baseline model. That is, expected firm value when the lender recalls shares to vote is still given by (12).

In Proposition 3, not recalling shares hurts firm value once ϕ is sufficiently high because fewer highly informed votes are cast. However, this downside is ameliorated in the current extension because dispersed shareholders also vote based on lending market information, partially replacing the lender's foregone votes. The tradeoff in Proposition 5 is then between two sources of error. When the lender does not recall shares, the voting outcome is incorrect with certainty when $\theta = l$ and $b = 0$, since the dispersed shareholders all vote for the status quo. When the lender recalls shares, the voting outcome is correct with lower probability across all other outcomes because the dispersed shareholders vote randomly. Expected firm value is therefore greater under the no-recall policy when $B(f^*)$ is large (reducing the likelihood of the $\theta = l$ and $b = 0$ outcome) or when $\overline{G}$ is small (increasing the probability of an incorrect outcome after recalling shares).

The assumption that all dispersed shareholders coordinate on the same public signal is admittedly stark. However, the broader insight is more general: to the extent that other voters condition their votes on financial market information such as stock prices or short interest, the lender will more aggressively seek to relax short-sale constraints, pushing the equilibrium closer to the results

derived in this extension. The random voting assumption in the baseline model should therefore be interpreted as a conservative benchmark—any degree of rational updating by dispersed shareholders strengthens the paper's main conclusions.

4.2 Pass-Through Voting

One of the most prominent developments in shareholder voting in recent years has been the introduction of pass-through voting. Traditionally, fund managers cast votes on behalf of their investors, but several prominent fund families (e.g., BlackRock and Vanguard) have introduced pass-through voting in which investors can decide whether to delegate their votes to the fund manager or cast their own votes. Pass-through voting, therefore, weakens the fund manager's effective voting power. See Malenko and Malenko (2024) for a benchmark analysis of how pass-through voting affects investor welfare.

However, lost in the discussion of pass-through voting is its impact on funds' securities lending activities. A little-emphasized detail in the commentary on pass-through voting is that even though shareholders can instruct funds how to vote, the fund still does not have to cast all of its votes. For example, Vanguard's pass-through voting program makes the following statement:

> "Additionally, shares of a security that are on loan pursuant to Vanguard's securities lending activities...could impact the total number of shares available for the fund to vote. In such cases, an investor's proportionate share will be calculated utilizing the number of shares eligible to be voted by the fund after excluding shares on loan..."[15]

That is, if 10% of a fund's shares are on loan, the fund would cast the remaining 90% in the proportion dictated to it via pass-through voting. The lender therefore still faces the same tradeoff between revenue, voting power, and information—though his decrease in effective voting power tilts his incentives toward revenue-maximization.

[15] https://corporate.vanguard.com/content/corporatesite/us/en/corp/about-our-funds/proxy-voting-across-funds/investor-choice.html (Footnote 1)

My baseline lender can then be interpreted as a fund that does not allow pass-through voting. To most clearly highlight how pass-through voting changes his incentives, let us now examine a lender with 100% pass-through voting participation. Given that pass-through voting is generally motivated by investors having different preferences than fund managers, I assume the investors vote in the same fashion as the dispersed shareholders in my baseline model. In this case, the lender's objective function becomes

$$\max_{f \geq 0} \frac{B(f)\lambda f}{2} + \alpha \frac{\pi}{2}$$

Observe that the value of the lender's shares no longer depends on the fee, since it has no impact on the voting outcome. As a result, the lender's optimal fee maximizes expected lending revenue.[16]

$$f^* = \frac{E[P|O_S = -\lambda] - \frac{\delta}{2}}{2}$$

The lender would also never recall shares since doing so no longer provides *him* with any extra votes. As a result, pass-through voting may give investors less say in voting outcomes than is commonly believed.

4.3 Discussion

Imperfectly Informed Borrower. The baseline model assumes the short seller is perfectly informed, reflecting the well-known empirical finding that short sellers are highly informed traders. A survey article by Reed (2013) refers to short sellers being informed traders as "one of the most robust findings of the literature." As the informativeness of borrowing demand declines, lenders will value this information source less and therefore be less willing to sacrifice revenue to acquire it. In the extreme case where borrowing demand is completely uninformative, lenders will be strict revenue-maximizers. The degree to which the informativeness of borrowing demand varies around the corporate voting cycle is an interesting question for future empirical research.

[16] This fee is always greater than zero due to the monotonicity of prices.

Index Funds and Governance. The fact that index funds hold diversified stakes in hundreds of firms has raised concerns about whether they have sufficient incentives to acquire firm-specific information for governance (Kahan and Rock (2020); Fisch et al. (2020); Brav et al. (2023)). However, this same feature also makes index funds prominent players in the securities lending market, enabling them to passively receive such information via their lending activities. My framework therefore predicts that concerns about index funds' lack of motivation to acquire firm-specific information for voting may be overstated if one ignores the information content of the securities lending market.

Proxy Advisors. Proxy advisors are in the business of selling voting recommendations to shareholders. The extent and desirability of their influence has been an active area of governance research (e.g.,Malenko and Malenko (2019); Malenko and Shen (2016); Iliev and Lowry (2014)). More recently, proxy advisors have come under political scrutiny, generating uncertainty about their role in corporate governance going forward.[17]. If one interprets the lender's private signal σ as a proxy advisor's recommendation, then a reduced role for proxy advisors would correspond to a decline in ϕ, making lending market information a relatively more valuable signal. As Figure 1 illustrates, this would make an equilibrium with $v_L^* = 0$ more likely to occur.

Equilibrium Recall. My model's result that recall does not occur in equilibrium follows from the insight that borrowers anticipate the lender's incentive to recall and thus will not borrow when the fee is in the recall-inducing range. However, while recall is rare in practice, it does occur (see D'Avolio (2002), Aggarwal et al. (2015), and Li and Zhu (2023) for empirical work on share recall). One way to generate equilibrium recall in my framework is to make the governance benefit stochastic.

[17]See President Trump's 2025 executive order "Protecting American Investors From Foreign-Owned and Politically Motivated Proxy Advisors." https://www.whitehouse.gov/presidential-actions/2025/12/protecting-american-investors-from-foreign-owned-and-politically-motivated-proxy-advisors/

Specifically, suppose that with probability $1-\epsilon$, δ takes a moderate value, and with probability ϵ, δ takes a value high enough that no fee can simultaneously deter recall and support equilibrium short selling—with the realization revealed after trade but before the recall decision. Such an outcome could represent an unexpected major development at the firm (merger, activism, etc.). The lender then recalls whenever the high realization occurs. Anticipating this, the short seller's borrowing threshold scales roughly by $1-\epsilon$, reflecting the lower likelihood of completing the short sale. Then, as $\epsilon \to 0$, this setup converges to the baseline, so for small ϵ the equilibrium features rare recall events without materially affecting the main results. Alternatively, a more behavioral approach could generate equilibrium recall by assuming that borrowers occasionally miscalculate the lender's governance benefit (e.g., due to fluctuations in the lender's ownership stake in the firm).

5 Conclusion

This paper challenges the conventional view that securities lending necessarily comes at the expense of governance. I develop a model in which institutional investors, by lending shares to informed short sellers, acquire valuable voting information in addition to revenue. Lenders commit not to recall shares in equilibrium by raising fees above the expected gain from recalling and voting an extra share. This outcome can nevertheless improve expected firm value because when short sellers anticipate being recalled, they do not borrow in the first place, eliminating the lending market as a source of information. By committing not to recall shares, lenders preserve this information source and make their remaining votes more informed.

These results have broader implications for current policy debates. The governance literature has questioned whether index funds have sufficient incentive to acquire firm-specific voting information, given their diversified holdings. However, by lending shares, index funds passively acquire a steady flow of such information, suggesting we may be underestimating the informativeness of their votes. This point takes on added significance as proxy advisors, a prominent source of voting

information, face increasing regulatory scrutiny. This framework also warns that pass-through voting programs carry an unintended cost. As lenders lose control over their votes, they no longer have the incentive to subsidize short sellers with lower fees, reducing the lending market's information content. In sum, the tradeoff between lending and governance is more nuanced than the existing debate suggests: one must consider the role of information to see the complete picture.

References

Aggarwal, R., Saffi, P. A. C., & Sturgess, J. (2015). The role of institutional investors in voting: Evidence from the securities lending market. *The Journal of Finance*, *70*(5), 2309–2346. https://doi.org/https://doi.org/10.1111/jofi.12284

Bar-Isaac, H., & Shapiro, J. (2020). Blockholder voting. *Journal of Financial Economics*, *136*(3), 695–717. https://doi.org/https://doi.org/10.1016/j.jfineco.2019.11.005

Bond, P., Edmans, A., & Goldstein, I. (2012). The real effects of financial markets. *Annual Review of Financial Economics*, *4*(Volume 4, 2012), 339–360. https://doi.org/https://doi.org/10.1146/annurev-financial-110311-101826

Brav, A., Malenko, A., & Malenko, N. (2023). Corporate governance implications of the growth in indexing. In *Oxford research encyclopedia of economics and finance*. Oxford University Press.

Brav, A., & Mathews, R. D. (2011). Empty voting and the efficiency of corporate governance. *Journal of Financial Economics*, *99*(2), 289–307. https://doi.org/https://doi.org/10.1016/j.jfineco.2010.10.005

Chague, F. D., Giovannetti, B., & Herskovic, B. (2025). Information leakage from short sellers. *NBER Working Paper*, *31927*. https://doi.org/10.3386/w31927

Chen, S., Kaniel, R., & Opp, C. (2025). Market power in the securities lending market. *Available at SSRN*. https://doi.org/https://dx.doi.org/10.2139/ssrn.4100699

Christoffersen, S. E., Geczy, C. C., Musto, D. K., & Reed, A. V. (2007). Vote trading and information aggregation. *The Journal of Finance*, *62*(6), 2897–2929. https://doi.org/https://doi.org/10.1111/j.1540-6261.2007.01296.x

D'Avolio, G. (2002). The market for borrowing stock. *Journal of Financial Economics*, *66*(2), 271–306. https://doi.org/https://doi.org/10.1016/S0304-405X(02)00206-4

Edmans, A., Goldstein, I., & Jiang, W. (2015). Feedback effects, asymmetric trading, and the limits to arbitrage. *American Economic Review*, *105*(12), 3766–97. https://doi.org/10.1257/aer.20141271

Fisch, J. E., Hamdani, A., & Davidoff Solomon, S. (2020). The new titans of wall street: A theoretical framework for passive investors. *University of Pennsylvania Law Review*, *168*, 17. https://doi.org/10.2139/ssrn.3192069

Goldstein, I. (2022). Information in financial markets and its real effects. *Review of Finance*, *27*(1), 1–32. https://doi.org/10.1093/rof/rfac052

Greppmair, S., Jank, S., Saffi, P., & Sturgess, J. (2024). Securities lending and information acquisition. *Available at SSRN*. https://doi.org/https://dx.doi.org/10.2139/ssrn.3604977

Honkanen, P. (2025). Securities lending and trading by active and passive funds. *Journal of Financial and Quantitative Analysis*, *60*(3), 1272–1309. https://doi.org/10.1017/S0022109024000966

Hu, E., Mitts, J., & Sylvester, H. (2020). *The index-fund dilemma: An empirical study of the lending-voting tradeoff*. https://doi.org/10.2139/ssrn.3673531

Hu, H. T., & Black, B. (2006). The new vote buying: Empty voting and hidden (Morphable) ownership. *Southern California Law Review*, *79*(4), 811–908.

Iliev, P., & Lowry, M. (2014). Are mutual funds active voters? *The Review of Financial Studies*, *28*(2), 446–485. https://doi.org/10.1093/rfs/hhu062

Kahan, M., & Rock, E. B. (2020). Index funds and corporate governance: Let shareholders be shareholders. *Boston University Law Review*, *100*(5), 1771–1816.

Kunzmann, A., & Meier, K. (2018). *A real threat? short selling and ceo turnover*. https://doi.org/10.2139/ssrn.2980450

Kyle, A. S. (1985). Continuous auctions and insider trading. *Econometrica*, *53*(6), 1315–1335. http://www.jstor.org/stable/1913210

Levit, D., Malenko, N., & Maug, E. (2024). Trading and shareholder democracy. *The Journal of Finance*, *79*(1), 257–304. https://doi.org/https://doi.org/10.1111/jofi.13289

Li, T., & Zhu, Q. (2023). *(re)call of duty: Mutual fund securities lending and proxy voting*. https://doi.org/10.2139/ssrn.4757185

Malenko, A., & Malenko, N. (2019). Proxy advisory firms: The economics of selling information to voters. *The Journal of Finance*, *74*(5), 2441–2490. https://doi.org/https://doi.org/10.1111/jofi.12779

Malenko, A., & Malenko, N. (2024). *Voting choice*. https://doi.org/10.2139/ssrn.4390367

Malenko, A., Malenko, N., & Tsoy, A. (2025). *Fund proliferation, decentralization, and shareholder power*. https://doi.org/10.2139/ssrn.6083066

Malenko, N., & Shen, Y. (2016). The role of proxy advisory firms: Evidence from a regression-discontinuity design. *The Review of Financial Studies*, *29*(12), 3394–3427. https://doi.org/10.1093/rfs/hhw070

Meirowitz, A., & Pi, S. (2022). Voting and trading: The shareholder's dilemma. *Journal of Financial Economics*, *146*(3), 1073–1096. https://doi.org/https://doi.org/10.1016/j.jfineco.2022.05.001

Nurisso, G. C. (2026). Learning by lending securities. *Journal of Financial Economics*, *178*, 104237. https://doi.org/https://doi.org/10.1016/j.jfineco.2026.104237

Pankratov, A. (2020). Securities lending and information transmission: A model of endogenous short-sale constraints. *Available at SSRN*. https://doi.org/https://dx.doi.org/10.2139/ssrn.3680016

Parlasca, M., & Voss, P. (2025). *Voting and trading on public information*. https://doi.org/https://dx.doi.org/10.2139/ssrn.4673547

Reed, A. V. (2013). Short selling. *Annual Review of Financial Economics*, *5*, 245–258. https://doi.org/https://doi.org/10.1146/annurev-financial-110311-101813

Speit, A., & Voss, P. (2020). *Shareholder votes on sale*. https://www.wiwi.uni-bonn.de/bgsepapers/boncrc/CRCTR224_2020_200.pdf

A Mathematical Appendix

A.1 Supplementary Proofs

Lemma A1. *The maximum opportunity cost that can support the short seller selling in the counterfactual where she is endowed with λ shares and there is no governance problem equals $\frac{\lambda\pi}{4}$. That is, $\bar{C} = \frac{\lambda\pi}{4}$.*

Proof. If there is no governance problem, then $\delta = 0$ and the lender's vote is irrelevant. In this case, $E[P|O = -\lambda] = \frac{\pi}{2}$ (the unconditional expected value of the firm) and $E[P|O = -2\lambda] = 0$ (since this trade perfectly reveals the state). As a result, S's expected selling price is $0.5E[P|O = -\lambda] + 0.5E[P|O = -2\lambda] = \frac{\pi}{4}$. Since S is endowed with λ shares, she does not pay any lending fee, and her expected close-out value is 0. Thus, S's expects profits equal to $\frac{\lambda\pi}{4}$. It then follows that as long as $c < \frac{\lambda\pi}{4}$, S will always sell in the low state, implying $\bar{C} = \frac{\lambda\pi}{4}$. □

Lemma A2. *At any equilibrium, $B(f^*) < 1$.*

Proof. The claim follows immediately if $c^* = 0$, so let us focus on the case where $c^* > 0$. Suppose by way of contradiction that $B^* = 1$. This outcome implies

$$\lambda \left(E[P|O_S = -\lambda] - G_M \delta - f^* \right) \geq \bar{C} = \frac{\lambda\pi}{4}$$

since the lender never recalls shares in equilibrium (Lemma 4) and $\bar{C} = \frac{\lambda\pi}{4}$ (Lemma A1). Next,

observe,

$$
\begin{aligned}
&\lambda\left(E[P|O_S=-\lambda]-G_M\delta-f^*\right)\geq\frac{\lambda\pi}{4}\\
\iff&\frac{1}{4}\left(\pi+\delta B^*(G_H+G_M-1)+v_L\delta(2G_H-1)(\phi(1-B^*)-(1-\phi))\right)+\frac{1}{2}G_M\delta-G_M\delta\geq\frac{\pi}{4}\\
\iff&\frac{1}{4}\left(B^*(G_H+G_M-1)+v_L(2G_H-1)(\phi(1-B^*)-(1-\phi))\right)\geq\frac{1}{2}G_M\\
\iff&B^*(G_H+G_M-1)+v_L(2G_H-1)(\phi(1-B^*)-(1-\phi))\geq 2G_M\\
\iff&B^*G_M+v_L(\phi(1-B^*)-(1-\phi))\geq 2G_M\\
\iff&\frac{1-B(f^*)}{2-B(f^*)}\geq G_M
\end{aligned}
$$

which never holds since $G_M > 0.5$ and $B(f^*) \in [0,1]$. The second line follows from the definition of $E[P|O_S=-\lambda]$ and $f^*>0$, the fifth line follows from $G_H \leq 1$, and the sixth line follows from the LHS being increasing in ϕ. □

Lemma A3. *The equilibrium short selling threshold c^* is strictly decreasing in f whenever $c^*>0$.*

Proof. Consider some arbitrary fee $f \geq 0$. The equilibrium shorting threshold c^* is found by solving the following equation for c: $\lambda(E[P|O_s=-\lambda]-\delta G_M-f)=c$ where $E[P|O_s=-\lambda]$ is as defined in (7). Solving, gives us:

$$
c^*=\frac{\left(2\,\delta\,\lambda\,\phi\,\pi-\delta\,\lambda\,\pi+2\,G_H\,\delta\,\lambda\,\pi-4\,G_H\,\delta\,\lambda\,\phi\,\pi\right)v_L+4\,f\,\lambda\,\pi-\lambda\,\pi^2+2\,G_M\,\delta\,\lambda\,\pi}{\left(4\,\delta\,\phi-8\,G_H\,\delta\,\phi\right)v_L+4\,G_H\,\delta-4\,\pi-4\,\delta+4\,G_M\,\delta}
$$

Taking the partial derivative with respect to f gives us

$$
\frac{\partial c^*}{\partial f}=-\frac{\lambda\,\pi}{\pi+\delta(1-G_H-G_M)+v_L(2\,G_H\,\delta\,\phi-\delta\phi)}<0
$$

□

A.2 Proofs of Section 3

Proof of Lemma 1

Proof. The proof follows immediately from the text by comparing the marginal benefit of recall $\alpha\delta G' = \frac{\alpha\delta}{2(1-\alpha-\lambda)}$ with the marginal cost f. □

Proof of Lemma 2

Proof. If the lender recalls shares, the short seller earns zero trading profits which makes her overall profits net of her opportunity cost c negative. Thus, the short seller will not attempt to borrow if she anticipates her lender recalling shares. □

Proof of Lemma 3

Proof. From Equation (10), the expected terminal value of the lender's shares is

$$\frac{\alpha}{2}\Big[\pi + \delta B(f)(\overline{G} + \underline{G} - 1) + v_L(2\overline{G} - 1)\delta(1-\phi)\Delta(f)\Big]$$

Since $(1-\phi)\Delta(f) = 2\phi - 1 - \phi B(f)$, the terms that include the fee are $\frac{\alpha}{2}\delta B(f) H_{v_L}(\phi)$, where

$$H_{v_L}(\phi) \equiv \overline{G} + \underline{G} - 1 - v_L\phi(2\overline{G} - 1)$$

Observe that $B(f) = \max(\frac{4c(f)}{\lambda\pi}, 0)$ is strictly decreasing in the fee when $c(f) > 0$ and does not depend on the fee otherwise. Suppose first that $c(f) > 0$. The partial derivative of the value of the lender's shares with respect to the fee is $\frac{\alpha}{2}\delta B'(f) H_{v_L}(\phi)$, which has the opposite sign of $H_{v_L}(\phi)$. If $v_L = 0$, then $H_0 = \overline{G} + \underline{G} - 1 > 0$ since $\overline{G} > \frac{1}{2}$ and $\underline{G} \geq \frac{1}{2}$. If $v_L = 1$, then $H_1(\phi)$ is strictly decreasing in ϕ since $\overline{G} > \frac{1}{2}$, and $H_1(\tilde{\phi}) = 0$ by the definition of $\tilde{\phi}$. Thus, $H_1(\phi) > 0$ for $\phi < \tilde{\phi}$ and $H_1(\phi) < 0$ for $\phi > \tilde{\phi}$. Now suppose $c(f) = 0$. Then the value of the lender's shares does not depend on the fee. □

Proof of Lemma 4

Proof. I first demonstrate that the lender's objective function is concave. The second derivative of (10) with respect to f is $-\frac{4\lambda}{\pi} < 0$. Thus, $\hat{f}(v_L)$ is the fee that maximizes the lender's expected profits.

Suppose first that $\hat{f}(v_L) \geq \underline{f}$. The lender's expected profits when he chooses $\hat{f}(v_L)$ must therefore be greater than his expected profits with a prohibitively high fee because $\hat{f}(v_L)$ is chosen optimally and is finite. However, the lender's expected profits with an infinitely high fee are equivalent to those defined in (9), as he attracts zero short sellers either way. Thus, the lender's expected profits are higher when he does not recall shares and charges $\hat{f}(v_L)$.

Now suppose that $\hat{f}(v_L) < \underline{f}$. Since the lender's objective function is concave, his expected profits are decreasing in f for any fee greater than $\hat{f}(v_L)$. Consequently, the lender's expected profits must be higher when charging the finite fee $\underline{f}$ than when charging an infinitely high fee. Then, repeating the argument from above, the lender's expected profits are higher when he does not recall shares and charges $\underline{f}$. □

Proof of Proposition 1

Proof. Given some conjectured equilibrium pair (v_L, f) we can plug into the short seller's indifference condition $c^* = \lambda\left[E[P|O_s = -\lambda] - \delta\underline{G} - f\right]$ and solve for c^*. When $f = \hat{f}(v_L)$, we have

$$c(\hat{f}(v_L)) = \frac{\left(2\,\alpha\,\delta\,\lambda\,\phi\,\pi - 4\,\alpha^2\,\delta\,\phi\,\pi - \alpha\,\delta\,\lambda\,\pi\right)v_L + 4\,\delta\,\alpha^2\,\pi - \alpha\,\lambda\,\pi^2 - 2\,\delta\,\alpha\,\lambda\,\pi - \lambda^2\,\pi^2 + 2\,\delta\,\lambda^2\,\pi + \lambda\,\pi^2 - \delta\,\lambda\,\pi}{(4\,\alpha\,\delta\,\phi)\,v_L + 8\,\pi - 4\,\alpha\,\delta + 2\,\delta\,\lambda - 8\,\alpha\,\pi - 8\,\lambda\,\pi} \tag{15}$$

and when $f = \underline{f}$ we have

$$c(\underline{f}) = -\frac{\lambda\,\pi\,(\delta - \pi + 2\,\alpha\,\delta - 2\,\delta\,\lambda + \alpha\,\pi + \lambda\,\pi + \alpha\,\delta\,v_L - 2\,\alpha\,\delta\,\phi\,v_L)}{4\,\pi - 4\,\alpha\,\delta + 2\,\delta\,\lambda - 4\,\alpha\,\pi - 4\,\lambda\,\pi + 4\,\alpha\,\delta\,\phi\,v_L} \tag{16}$$

For expository reasons, I characterize the equilibria as ϕ increases from 0.5 to 1. Let us start with $\phi = 0.5$. When $\phi = 0.5$, voting choice $v_L = 0$ is always optimal since $\Delta(f) = -B(f) \leq 0$. The

lender's equilibrium fee then depends on whether $\hat{f}(0)$ is greater than $\underline{f}$. I now show that either $\hat{f}(0)$ or $\underline{f}$ is always the lender's optimal for the lender, though never at the same time (except for the knife-edge case where $\hat{f}(0) = \underline{f}$). To demonstrate this claim, denote the lender's optimal deviation fee when the market expects him to select $f^* = \underline{f}$ as f_d. Intuitively, f_d equals $\hat{f}(v_L)$ evaluated at $c^*(\underline{f})$.

Suppose the market maker believes the lender is choosing $f^* = \hat{f}(0) > \underline{f}$. This choice will be the equilibrium fee whenever the resulting $\hat{f}(0)$ evaluated at $c^*(\hat{f}(0))$ is greater than $\underline{f}$. Suppose this is the case and $f^* = \hat{f}(0)$. I then show that choosing $\underline{f}$ is not an additional equilibrium. To do so, I must show that $f_d > \underline{f}$. Suppose the market maker instead believes the lender is choosing $\underline{f} < \hat{f}(0)$. By lemma A3, this lower fee causes c^* and B^* to increase. A greater B^* then, in turn, implies a higher $E[P|O_S = -\lambda]$ (via (7)) and $\hat{f}(0)$ (via (11). Thus, $f_d > \hat{f}^*(0) > \underline{f}$, so the lender will deviate to his optimal fee, ruling out $\underline{f}$ as an equilibrium fee. Now suppose $\hat{f}(0) < \underline{f}$ so $\hat{f}(0)$ is not an equilibrium. By following the same logic in reverse, $f_d < \hat{f}(0) < \underline{f}$, so $\underline{f}$ must be the lender's optimal fee. Thus, when $\phi = 0.5$, a single pure strategy equilibrium always exists: the lender votes $v_L = 0$ and chooses $f^* = \max(\hat{f}(0), \underline{f})$.

Now consider what happens as ϕ increases. As neither the short seller's expected selling price (from (7)), nor her close-out value (δG_M), nor her fee (either (6) or (11)) depend on ϕ when $v_L = 0$, neither must c^* or B^*. Thus, the equilibrium when $\phi = 0.5$ persists as ϕ increases until $\Delta(f^*) > 0 \iff \phi > \frac{1}{2-B^*}$. I next show that beyond this point, $v_L^* = 1$ is the lender's unique equilibrium voting strategy.

Consider first the case where $f^* = \hat{f}(0)$ when $\phi = 0.5$. I first show that $\hat{f}(1) > \hat{f}(0)$ for all ϕ and then that the minimum ϕ supporting $(v_L = 1, \hat{f}(1))$ as an equilibrium strategy is lower than the maximum ϕ supporting $(v_L = 0, \hat{f}(0))$ as an equilibrium strategy. First, by solving for c^* when $f^* = \hat{f}(1)$ and $v_L^* = 1$, we can plug into the formula for $f^* = \hat{f}(1)$ and take the second derivative

with respect to ϕ to get

$$\frac{\partial^2 \hat{f}(1)}{\partial \phi^2} = \frac{\delta^2 \pi \left(2 G_H - 1\right)^2 \left(8\alpha\pi - \delta \lambda - 3 \lambda \pi\right)}{2 \lambda \left(\delta + 2 \pi - G_H \delta - G_M \delta - \delta \phi + 2 G_H \delta \phi\right)^3} > 0$$

This implies that the first derivative takes its minimum value at $\phi = 0.5$. Plugging it we get:

$$\frac{\partial \hat{f}(1)}{\partial \phi}|_{\phi=0.5} = \frac{\delta \left(2 G_H - 1\right) \left(\left(8 \alpha + 3 \lambda\right) \pi^2 + \left(8 \alpha \delta + \delta \lambda - 16 G_M \alpha \delta\right) \pi + 4 \alpha {G_M}^2 \delta^2 - 4 \alpha G_M \delta^2 + \alpha \delta^2\right)}{\lambda \left(\delta + 4 \pi - 2 G_M \delta\right)^2} > 0$$

Thus, $\hat{f}(1)$ takes its minimum value at $\phi = 0.5$, so to show $\hat{f}(1) > \hat{f}(0)$ for all ϕ, I just have to show that this same equality holds at $\phi = 0.5$ (since $\hat{f}(0)$ does not depend on ϕ). The difference between the two fees equals

$$\hat{f}(1)|_{\phi=0.5} - \hat{f}(0) = \frac{\delta \left(\alpha c_1^* - 2 \alpha c_0^* + c_0^* \lambda - c_1^* \lambda + \alpha^2 \pi\right)}{\lambda \pi \left(1 - \alpha - \lambda\right) 4}$$

where c_1^* is the shorting threshold when ($v_L = 1$ and $f = \hat{f}(1)$) is the lender's strategy; c_0^* is defined analogously. It is immediately apparent that this difference is increasing in c_1^* and decreasing in c_0^*, so let us look at the this expression when $c_1^* = 0$ and $c_0^* = \frac{\lambda\pi}{4}$. Plugging in makes the difference equal $\frac{\delta \left(4 \alpha^2 - 2 \alpha \lambda + \lambda^2\right)}{16 \lambda \left(1 - \alpha - \lambda\right)} > 0$. Thus, $\hat{f}(1) > \hat{f}(0)$ for all ϕ.

Next, I show that for any set of parameters that result in $\hat{f}(0) > \underline{f}$, if $\Delta(\hat{f}(1)) > 0$, then $\Delta(\hat{f}(0)) > 0$. First, observe that

$$\frac{\partial c_1^*}{\partial \phi} = \frac{\delta \pi \left(2 G_H - 1\right) \left(\delta \lambda - 8 \alpha \pi + 3 \lambda \pi\right)}{4 \left(\delta + 2 \pi - G_H \delta - G_M \delta - \delta \phi + 2 G_H \delta \phi\right)^2} < 0$$

Thus, both $\Delta(\hat{f}(1))$ and $\Delta(\hat{f}(0))$ are increasing functions of ϕ. Next, I show that $c_0^*(\hat{f}(0)) > c_1(\hat{f}(1))^*$ for all ϕ. To see this, observe that $c_1^*(\hat{f}(1))$ is decreasing in ϕ

$$\frac{\partial c_1^*(\hat{f}(1))}{\partial \phi} = \frac{\delta \pi \left(2 G_H - 1\right) \left(\delta \lambda - 8 \alpha \pi + 3 \lambda \pi\right)}{4 \left(\delta + 2 \pi - G_H \delta - G_M \delta - \delta \phi + 2 G_H \delta \phi\right)^2} < 0$$

Then, by comparing $c_0(\hat{f}(0))$ (which does not depend on ϕ) with $c_1(\hat{f}(1))$ evaluated at $\phi = 0.5$, we

can see that

$$c_0^*(\hat{f}(0)) - c_1^*(\hat{f}(1))|_{\phi=0.5} = \frac{\delta\,\pi\,(2\,G_H - 1)\,(8\,\alpha\,\pi + \lambda\,\pi - 2\,G_M\,\delta\,\lambda)}{4\,(\delta + 4\,\pi - 2\,G_M\,\delta)\,(\delta + 2\,\pi - G_H\,\delta - G_M\,\delta)} > 0$$

Thus, $c_0^*(\hat{f}(0)) > c_1(\hat{f}(1))^*$ for all ϕ.

It then follows that at any given level of ϕ, $\Delta(\hat{f}(1)) > \Delta(\hat{f}(0))$ since both sides of the inequality are increasing functions of ϕ, $\Delta(f)$ is decreasing in c, and $c_0^*(\hat{f}(0)) > c_1^*(\hat{f}(1))$ for all ϕ. As a result, once ϕ is sufficiently high so that $(v_L^* = 0, f^* = \hat{f}(0))$ is no longer viable as an equilibrium, we immediately transition to $(v_L^* = 1, f^* = \hat{f}(1))$ being the unique equilibrium for all ϕ beyond that point. This claim follows because $\hat{f}(1)$ is increasing in ϕ. There are also multiple equilibria in the region of ϕ where both $\Delta(\hat{f}(1)) > 0$ and $\Delta(\hat{f}(0)) < 0$.

Consider now the case where $f^* = \underline{f}$ when $\phi = 0.5$. Once we transition to the point where $v_L^* = 0$ is no longer feasible given that fee, the lender either chooses $(v_L^* = 1, f^* = \hat{f}(1))$ or $(v_L^* = 1, f^* = \underline{f})$. The first case occurs when $\hat{f}(0) < \underline{f} < \hat{f}(1)$, which we have already established as possible since $\hat{f}(0) < \hat{f}(1)$. In this case, we can then mostly repeat our argument from above to show that once $(v_L^* = 0, f^* = \underline{f})$ is no longer viable as an equilibrium as ϕ increases, we transition to the pair $(v_L^* = 1, f^* = \hat{f}(1))$ being the unique equilibrium for all ϕ beyond that point—as well as there being an intermediate region of ϕ with multiple equilibria. The only additional step needed to make this claim is to demonstrate that $c_0^*(\underline{f}) > c_1^*(\hat{f}(1))$ for all ϕ where $(v_L^* = 1, f^* = \hat{f}(1))$ is a viable equilibrium strategy. This claim can be demonstrated by observing (i) $c_0^*(\underline{f}) = c_1^*(\underline{f})$ at the maximum ϕ supporting $v_L = 0$ as an equilibrium voting strategy given fee $\underline{f}$, (ii) $\underline{f} < \hat{f}(1)$, (iii) $\hat{f}(1)$ is increasing in ϕ, and (iv) Lemma A3.

Finally consider the case where where $f^* = \underline{f}$ when $\phi = 0.5$ and $\hat{f}(0) < \hat{f}(1) \leq \underline{f}$ at the maximum fee sustaining $(v_L^* = 0, f^* = \underline{f})$ as an equilibrium. This case is the simplest and involves no overlap because $\Delta(\underline{f}) = 0$ at the transition point, resulting in the same equilibrium prices, fees, and shorting cutoffs. Put differently, the cases (i) $v_L = 0$ and (ii) $v_L = 1$ with $\Delta(f) = 0$ lead to the same economic outcomes. Beyond that point, $v_L = 1$ is the unique equilibrium voting strategy,

and $f^* = \underline{f}$ will continue to be the fee as ϕ increases until $\hat{f}(1)$ gets sufficiently large. Whether we ever transition to the fee $\hat{f}(1)$ depends on the sign of $\hat{f}(1) - \underline{f}$ evaluated at $\phi = 1$. This difference equals $-\frac{\pi\,(\delta-\pi+\alpha\,\delta-2\,\delta\,\lambda+\alpha\,\pi+\lambda\,\pi)}{2\,(4\,\pi+\delta\,\lambda-4\,\alpha\,\pi-4\,\lambda\,\pi)}$ which can be positive or negative depending on the parameters.[18]

□

Proof of Proposition 2

Proof. Let us start with the case where $f^* = \hat{f}(v_L)$. Taking the partial derivative of 15 with respect to δ gives us

$$\frac{\partial c(\hat{f}(v_L^*))}{\partial \delta} = -\frac{\pi^2\,(1-\alpha-\lambda)\left(4\,\lambda+6\,\alpha\,\lambda-16\,\alpha^2-7\,\lambda^2+16\,\alpha^2\,\phi\,v_L^*+4\,\alpha\,\lambda\,v_L^*-6\,\alpha\,\lambda\,\phi\,v_L^*\right)}{2\left(4\,\pi-2\,\alpha\,\delta+\delta\,\lambda-4\,\alpha\,\pi-4\,\lambda\,\pi+2\,\alpha\,\delta\,\phi\,v_L^*\right)^2}$$

By inspection, it follows that

$$\text{Sign}\left(\frac{\partial c(\hat{f}(v_L^*))}{\partial \delta}\right) = -\text{Sign}\left(4\,\lambda+6\,\alpha\,\lambda-16\,\alpha^2-7\,\lambda^2+16\,\alpha^2\,\phi\,v_L^*+4\,\alpha\,\lambda\,v_L^*-6\,\alpha\,\lambda\,\phi\,v_L^*\right)$$

The sign of the expression on the right hand side is ambiguous. For example, suppose $v_L^* = 0$. When $(\pi, \alpha, \lambda, \delta, \phi) = (1, 0.3, 0.2, 0.1, 0.5)$, this expression equals $-\frac{14}{25}$, implying the partial derivative is positive. Conversely, when $(\pi, \alpha, \lambda, \delta, \phi) = (1, 0.1, 0.09, 0.1, 0.5)$, the expression equals $\frac{1973}{10000}$, implying the partial derivative is negative. Next, suppose $v_L^* = 1$. When$(\pi, \alpha, \lambda, \delta, \phi) = (1, 0.3, 0.2, 0.1, 0.99)$, this expression equals $\frac{1873}{2500}$, implying the partial derivative is negative. On the other hand, when $(\pi, \alpha, \lambda, \delta, \phi) = (4, 0.449, 0.1, 0.05, 0.674)$, this expression equals $-\frac{28382901}{62500000}$, implying the partial derivative is positive.

Next, take the partial derivative of 16 with respect to δ. This expression equals:

$$\frac{\partial c(\underline{f})}{\partial \delta} = -\frac{\lambda\,\pi^2\,(1-\alpha-\lambda)\,(2\,\alpha-3\,\lambda+2\,\alpha\,v_L-2\,\alpha\,\phi\,v_L+2)}{2\,(2\,\pi-2\,\alpha\,\delta+\delta\,\lambda-2\,\alpha\,\pi-2\,\lambda\,\pi+2\,\alpha\,\delta\,\phi\,v_L)^2}$$

[18] For example, the parameterization $\lambda = 0.1, \pi = 2, \alpha = 0.43$, and $\delta = 0.82$ yield a negative value and $\lambda = 0.1, \pi = 1, \alpha = 0.2$, and $\delta = 0.1$ yields a positive value.

The sign of the partial derivative will be opposite that of $(2\,\alpha - 3\,\lambda + 2\,\alpha\,v_L - 2\,\alpha\,\phi\,v_L + 2)$. I claim that this expression is always positive. To see this, first observe that Assumption 2 implies that $\lambda < \frac{1}{3}$, meaning that $3\lambda < 2$.[19] Next, note that $2\alpha v_L(1-\phi) > 0$. As a result, all negative terms in the expression are dominated by other positive terms, implying that the expression is positive, which further implies the partial derivative is negative.

□

Proof of Proposition 3

Proof. The lender only has a decision to recall shares when $c^* > 0$, so let us assume that the parameters are such that this inequality holds. I show that regardless of the lender's equilibrium strategy, there exists some $\phi^\star \in (0.5, 1)$ such that for all $\phi < \phi^\star$, expected firm value is greater when the lender does not recall shares.

To start, when the lender recalls shares expected firm value is defined by Equation (12). It is plain to see that this expression is strictly increasing in ϕ.

Next, let us consider equilibria where the lender votes $v_L^* = 0$ and does not recall shares. Here equilibrium firm value does not depend on ϕ. Thus, the proposition follows after showing that expected firm value is higher (lower) when the lender does not recall shares at $\phi = 0.5$ ($\phi = 1$). When $\phi = 0.5$, $E[\Pi|\text{recall}, \phi = 0.5] = \frac{\pi}{2} < \frac{\pi}{2} + \frac{\delta B(f^*)(G_H+G_M-1)}{2} = E[\Pi|\text{no recall}, \phi = 0.5]$. This inequality follows because $B(f^*) > 0$ and $G_H, G_M > 0.5$. When $\phi = 1$, $E[\Pi|\text{recall}, \phi = 1] = \frac{\pi}{2} + \frac{\delta(2G_H-1)}{2} > \frac{\pi}{2} + \frac{\delta B(f^*)(G_H+G_M-1)}{2} = E[\Pi|\text{no recall}, \phi = 1]$. This inequality also follows from $B(f^*) < 1$ and $G_H > G_M > 0.5$.

Then, let us consider the case where the lender votes $v_L^* = 1$ and does not recall shares. Subtracting (12) from (13) gives us $\frac{\delta B(f^*)(G_H+G_M-1-\phi(2G_H-1))}{2}$. Recall that we are focusing on the case where $c^* > 0$ (and thus $B(f^*) > 0$). Thus, the expression will have the same sign as $H(\phi) \equiv G_H+G_M-1-\phi(2G_H-1)$. Observe that $H(0.5) = G_M-0.5 > 0$ and $H(1) = G_M-G_H < 0$.

[19] That is, we can only have $\lambda \leq \alpha < \frac{1-\lambda}{2}$ if $\lambda < \frac{1-\lambda}{2} \iff \lambda < \frac{1}{3}$.

Moreover, since neither G_H, G_M depend on ϕ, there exists a unique value of ϕ such that $H(\phi) = 0$: $\phi = \frac{G_H + G_M - 1}{2G_H - 1}$.

Putting it all together, regardless of the lender's strategy, there exists some level of ϕ such that for all ϕ less than that amount, firm value will be higher when the lender does not recall shares. We can then refer to the lowest such ϕ as $\phi^\star$. □

A.3 Proofs of Section 4

Proof of Proposition 4

Proof. The short seller's expected selling price is $E[P|O_s = -\lambda] = \frac{1}{4}(\pi + B(f^*)\delta) + \frac{1}{2}\delta$ where $B(f^*) = \frac{c(f^*)}{C}$. Thus, the shorting cutoff is pinned down by the solution to

$$\lambda(E[P|O_S = -\lambda] - f^* - \delta) = c^*$$

where f^* is defined in (14). Solving gives us

$$c(f^* > 0) = \frac{\pi\,(4\,\alpha\,\delta - 2\,\delta\,\lambda + \lambda\,\pi)}{8\pi - 4\delta}$$

when $f^* > 0$. Taking the partial derivative with respect to δ gives us

$$\frac{\partial c(f^* > 0)}{\partial \delta} = \frac{\pi^2\,(8\,\alpha - 3\,\lambda)}{4\,(2\pi - \delta)^2} > 0$$

Following a similar procedure when $f^* = 0$, we get

$$c(f^* = 0) = \frac{\lambda\,\pi\,(\pi - 2\,\delta)}{4\,(\pi - \delta)}$$
$$\implies \frac{\partial c(f^* = 0)}{\partial \delta} = -\frac{\lambda\,\pi^2}{4\,(\pi - \delta)^2} < 0$$

□

Proof of Proposition 5

Proof. Expected firm value when the lender recalls shares is given by 12. When the lender does not recall shares, firm value will equal δ in the low state when shares are borrowed (probability $\frac{B(f^*)}{2}$), 0 in the low state when shares are not borrowed, and π in the high state (probability $\frac{1}{2}$). Thus, expected firm value equals $\frac{1}{2}(\pi + \delta B(f^*))$. Comparing the two values, expected firm value will be greater when the lender does not recall shares and $\phi = 1$ if and only if

$$\begin{aligned} &\frac{1}{2}(\pi + \delta B(f^*)) > \frac{1}{2}(\pi + \delta[(2\overline{G} - 1)]) \\ \iff &B(f^*) > (2\overline{G} - 1) \end{aligned}$$

□

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