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From Short Sellers to Security Lenders: A Survey of Real Effects in Securities Lending Markets

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From Short Sellers to Security Lenders: A Survey of Real Effects in Securities Lending Markets

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Abstract

We survey the growing literature on the real effects of short selling and securities lending. We organize the evidence around four channels: the *Feedback* channel, through which short selling affects stock prices and thereby corporate decisions; the *Disciplining* channel, through which the threat of short selling constrains managerial misbehavior; the *Competition* channel, through which short sellers affect the incentives and decisions of other stakeholders; and the *Lender Incentive* channel, through which lenders' considerations and preferences translate into real effects. The consideration of real effects connects the traditional literature on short selling and price discovery to a broader question: how do securities-lending markets affect firms, managers, other stakeholders, and the real economy? This perspective also highlights a fundamental tension: the private returns captured by informed short sellers need not reflect the public value of their real impacts, calling for more research to understand and quantify the broader economic role of securities-lending markets.

Keywords: Short selling, securities lending, real effects, feedback, disciplining, competition, security lenders.
JEL Classification Codes: G14, G23, G31, G32

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1. Introduction

Short selling plays a unique role in financial markets because investors with negative information may face a trading constraint. An investor who believes a security to be undervalued can express that view by buying it. In contrast, an investor who believes the security to be overvalued must first borrow the security before selling it, unless he already owns it. This asymmetry has generated a large literature on whether short sellers are informed, whether short-sale constraints lead to overvaluation or slow price discovery, how borrowing costs affect trading, and how short selling affects liquidity and market quality. The evidence generally supports an important informational role for short sellers and highlights how the securities-lending market affects their ability to trade.

Several existing surveys synthesize different parts of this literature. Reed (2013) provides a broad review of short selling, including the motivations and information of short sellers, the institutional details of short selling and equity lending, and the empirical literature on regulation and corporate events. Jiang, Habib, and Hasan (2022) review the literature from an accounting and corporate-decision perspective, emphasizing short sellers as information intermediaries and the spillovers of their information production to financial reporting, auditing, and corporate decisions. More recent reviews examine particular dimensions of short selling: Edwards, Reed, and Saffi (2024) survey short-selling regulation; Khan (2024) reviews the theory and evidence on short-sale constraints and stock returns; and Ringgenberg (2026) provides an updated overview of short selling and financial markets. Taken together, these surveys provide extensive evidence that short selling is informed, leads to price discovery, improves market quality, opening up a debate on whether it should be constrained or regulated. We take this literature as our starting point rather than resurveying it in full.

This survey asks a different question: how do short selling and securities lending affect decisions and outcomes in the real economy? In this survey, we focus on the "real effects": the impact of short selling and securities lending on the decisions and outcomes of firms and related economic agents. These effects would be absent or substantially weaker, or would operate

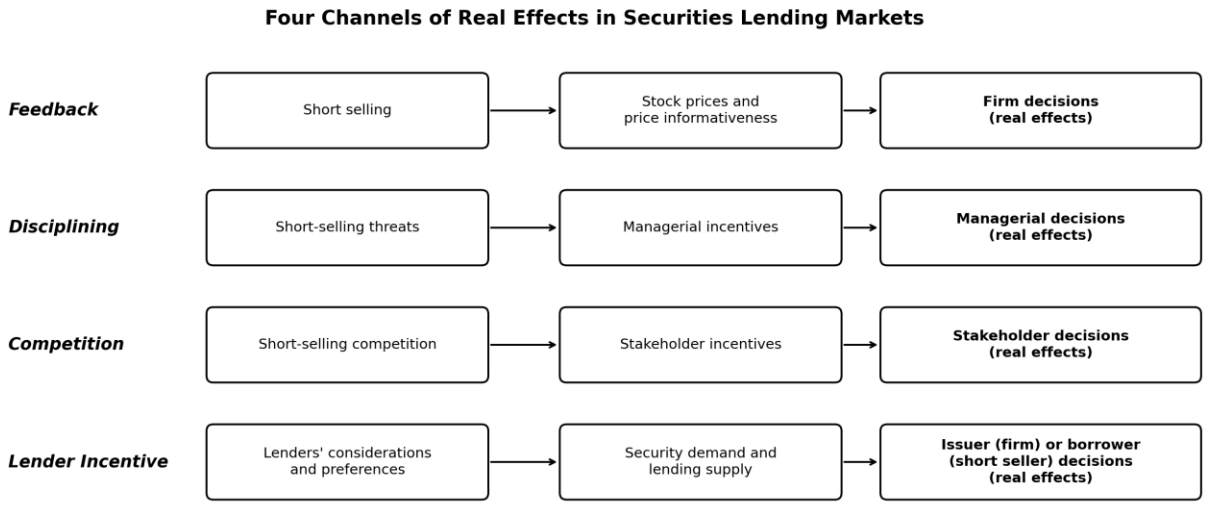
differently, in the absence of securities lending. An increase in short interest, a change in lending fees, or an improvement in price efficiency is therefore not by itself the real effect of interest. We zoom on whether and how these financial-market effects of short selling become real when they change either the investment, financing, and innovation decisions of firms, or the incentives of the managers, or the decisions of other stakeholders.

This perspective connects the short-selling literature to the broader literature on the real effects of financial markets. Financial prices can affect real decisions when managers and other agents learn from prices or respond to market conditions. The real-effects literature studies this feedback from financial markets to corporate and economic decisions. Our survey lies at the intersection of these two literatures. We take the traditional findings on short selling and price discovery as the foundation and ask what happens next. When securities lending allows negative information to be expressed, which decisions of firms and related economic agents are affected, and through what mechanisms?

We organize the literature through four channels: the *Feedback* channel, the *Disciplining* channel, the *Competition* channel, and the *Lender Incentive* channel. The *Feedback* channel focuses on how short-selling-induced changes in stock prices feed back into firm decisions – i.e., short-selling provides information to the managers. The *Disciplining* channel focuses on managerial decisions when agency problems are present – i.e., short-selling helps to discipline the managers. The *Competition* channel examines how short sellers affect the incentives and decisions of other corporate stakeholders. The *Lender Incentive* channel turns to the security owners and asks what determines their lending decisions and how their lending activities subsequently affect market and real outcomes.

The first three channels emphasize real effects originating from short sellers, while the fourth shifts attention to security lenders and their incentives. Figure 1 summarizes these four channels; below, we discuss the logic of each in turn.

Figure 1. Four Channels of Real Effects in Securities Lending Markets



The *Feedback* channel provides a direct link from short selling to real outcomes through stock prices. Short selling can affect stock prices by allowing negative information to be incorporated into prices. If firms' decision makers learn from prices, or if market prices otherwise affect the conditions facing firms, these changes can affect real corporate outcomes. This channel does not require managerial agency problems. Even managers acting fully in shareholders' interests may adjust investment, financing, innovation, or other corporate decisions in response to changes in stock prices. Grullon, Michenaud, and Weston (2015) provide a good example. They show that relaxing short-sale constraints affects stock prices and corporate investment.

The *Disciplining* channel differs from the *Feedback* channel by operating directly through managerial incentives, thereby helping to mitigate existing agency problems. Unlike the *Feedback* channel, the *Disciplining* channel does not require a realized price effect: the anticipation of short selling can itself change managerial behavior. Short sellers have incentives to identify overvaluation, misconduct, and other negative information. Their ability to establish negative positions increases the potential cost to managers when misconduct is discovered and incorporated into prices. Managers may therefore adjust their behavior in anticipation of short selling. This mechanism encompasses evidence on earnings management, fraud, disclosure, tax avoidance, and value-destroying acquisitions. For instance, Fang, Huang, and Karpoff (2016) and Massa, Zhang,

and Zhang (2015), among others, show that greater short-selling potential can reduce earnings management.

The *Competition* channel shifts attention from managers to other agents. The entry of informed short sellers can change the private value of possessing and acting on information for other agents. Direct competition for informational rents provides a clean benchmark. These agents may respond by changing when and how much they trade, whether they intervene in governance, or how they acquire and use information. Massa, Qian, Xu, and Zhang (2015), for example, show that short-selling competition changes corporate insiders' trading behavior. Related work studies blockholder intervention, information acquisition, boards, creditors, media, employees, and customers. More broadly, competition among agents can take different forms and affect how they acquire, use, and trade on information.

The first three channels view securities lending primarily from the borrower side: they ask what becomes possible when investors can borrow securities and establish short positions. The *Lender Incentive* channel reverses the perspective and focuses on security owners themselves. Every borrowed security must be supplied by an owner, and a growing literature shows that security lenders are not passive suppliers of inventory. Institutional investors decide whether and what to lend, respond to lending fees and borrowing demand, learn from lending-market activity, adjust their portfolios, and recall securities when lending conflicts with voting or other objectives. Their lending decisions are therefore jointly shaped by investment objectives, lending revenues, information, and governance considerations. We survey this literature while paying particular attention to how lenders' considerations and preferences can ultimately generate real effects.

The lender perspective also broadens the survey beyond equity markets. Corporate bonds provide a particularly important setting because informed short selling appears more limited than in the equity market. For example, Goyal, Nozawa, and Qiu (2026) show that corporate-bond short selling is driven importantly by dealer market-making activity rather than solely by informed speculation. More broadly, bond borrowing can reflect dealer intermediation, inventory management, settlement needs, and other institutional considerations, while securities lending can also affect investors' incentives to hold bonds. These features make corporate bonds particularly

useful for understanding how securities lending can generate real effects through security lenders rather than short sellers.

The four-channel framework also highlights that securities lending is a two-sided market in which both borrowers and lenders can contribute to real effects. Borrowers' willingness to short depends on expected mispricing, borrowing costs, and the availability of lendable securities, while lenders' willingness to supply securities depends on lending revenue, portfolio considerations, governance objectives, and other constraints. Existing theoretical models, such as Duffie, Gârleanu, and Pedersen (2002), Blocher, Reed, and Van Wesep (2013), and Kolasinski, Reed, and Ringgenberg (2013), formalize different aspects of this interaction. However, these models focus primarily on trading, prices, and lending-market outcomes. How the interaction between borrowers and lenders ultimately affects real economic decisions remains much less explored.

Our survey therefore differs from existing reviews in two related respects. First, we emphasize the real effects of short selling and securities lending rather than their institutional mechanisms and effects on prices and market quality. Second, we treat securities lending as an economic mechanism in its own right rather than simply as a constraint on short sellers. This broader perspective allows us to examine not only how securities lending conditions affect short selling, but also how the considerations and preferences of security lenders can affect firms and other economic agents.

These differences allow us to ask questions that are difficult to address when the analysis stops at trading and prices. The following sections survey the related evidence on how short selling and securities lending affect the decisions of firms and other economic agents. Taken together, this evidence also raises open questions for future research. For instance, if short selling affects real decisions, the private benefits captured by informed short sellers need not coincide with the public value generated through their real impacts. Greater competition among informed short sellers can reduce individual informational rents while improving the information available for real decisions and hence the public value. The real-effects perspective therefore points to a potential tension between the private returns needed to sustain informed short selling and the public value that informed short selling creates.

The remainder of the survey proceeds as follows. Section 2 presents the four-channel conceptual framework and places the four channels within the two-sided securities-lending market. Sections 3 and 4 review the empirical evidence on the real effects arising through the *Feedback*, *Disciplining*, *Competition*, and *Lender Incentive* channels. Section 5 synthesizes the evidence and proposes directions for future research, including the private and public value of informed short selling. Section 6 concludes.

2. A Conceptual Framework: How Can Securities Lending Have Real Effects?

Securities lending permits investors to borrow securities and, among other uses, establish short positions. The literature surveyed here shows that its economic effects can extend beyond trading and price formation to corporate investment and financing, managerial behavior, and the incentives of other informed market participants. We organize this literature by the mechanism through which securities lending changes real decisions rather than by the particular outcome studied. As Figure 1 summarizes, each channel is defined relative to a counterfactual: what mechanism would be absent or substantially weaker without securities lending, and what decisions change when that mechanism becomes available?

2.1 The Distinct Economic Roles of Securities Lending

Consider a market in which short selling and securities lending do not exist. Four features of that market are important. Each will turn out to be the starting point for one channel.

First, short-sale constraints can impede the incorporation of negative information into prices. An investor with positive information can buy the security directly. An investor with negative information who does not already own the security cannot take the corresponding negative position without borrowing it. Negative information must then be reflected through other investors' trading or through subsequent disclosure, and price adjustment can be slower (Miller, 1977; Diamond and Verrecchia, 1987). In other words, the absence of short selling makes it more difficult for negative information to be impounded into prices.

Second, the traditional governance literature emphasizes voice and exit by existing shareholders (Hirschman, 1970). Voice includes monitoring, engagement, voting, and

intervention, while exit refers to shareholders selling their stakes. Both can discipline managers, with voice operating through direct intervention and exit through the effect of anticipated selling on the stock price relevant for managers' equity-linked incentives (Admati and Pfleiderer, 2009; Edmans, 2009). In addition to voice and exit, short selling adds a distinct mechanism because an informed outsider need not own the stock before acting on adverse information. The possibility that such information will be traded upon can therefore affect managerial incentives even when the informed party is not an existing shareholder. In other words, without short selling, this source of external discipline on managers would be weaker.

Third, securities lending can change competition among investors and other market participants, with particularly important effects on informed agents. When short-selling capacity is limited, an informed blockholder or insider may face fewer competing traders on negative information. Greater lending supply can allow additional informed short sellers to enter, accelerating information incorporation while reducing the informational rents available to incumbent informed agents. This change in rents can alter a blockholder's choice between governance and exit and an insider's trading strategy. In other words, without short selling, this source of competition would be weaker, altering the incentives and decisions of blockholders and other informed agents.

Fourth, securities lending can affect the value of ownership to the lender. In addition to expected cash flows and risk, an institutional investor may value a security because it can generate lending fees, collateral-management benefits, or other lending-related benefits. Lenders may also learn from borrowing demand and use that information in their portfolio decisions. Separately, securities lending can affect lenders' governance incentives because lending or recalling securities can alter their ability to vote and exercise other ownership rights. These lender-side incentives can affect lending supply, portfolio demand, asset prices, and, in some settings, issuer financing. In other words, without securities lending, these additional lender-side incentives would be absent, potentially changing lenders' portfolio and governance decisions and, ultimately, firms' financing decisions.

Overall, securities lending relaxes each of these limitations through different, though interconnected, economic actors. The four channels capture different ways in which securities lending can change real outcomes.

2.2 Four Channels

Channel 1: Feedback. The theoretical foundation of this channel begins with Miller (1977), who argues that when investors disagree and short selling is constrained, negative views are more difficult to express in prices. Diamond and Verrecchia (1987) sharpen this intuition within a rational-expectations framework: constraints need not bias prices upward on average because rational investors anticipate the missing trades, but they slow the adjustment of prices to private information, especially negative information. Later models endogenize these constraints and the incentives to acquire and trade on information. Lenkey (2021), for example, shows that short-sale restrictions can also alter risk sharing, information acquisition, and market depth.

Securities lending supplies the missing instrument identified by this literature: a pessimistic investor can borrow a security, sell it, and thereby allow her negative information to be reflected in price just as a positive-information investor's purchase would be. Formally,

$$\text{Short-selling activity} \uparrow \;\rightarrow\; \text{stock price} \downarrow \text{ and/or price informativeness} \uparrow$$

These are market-price effects, and by themselves they are not yet the real effects that we are interested in examining in this survey. The real-effects step requires a second link, in which changes in stock prices affect the conditions facing firms or provide information for managers' and investors' decisions:

$$\text{Stock price} \downarrow \text{ and/or price informativeness} \uparrow \;\rightarrow\; \text{corporate decisions sensitive to stock prices or price informativeness}$$

This second link is the subject of a substantial literature on feedback from financial markets to the real economy generally (Bond, Edmans, and Goldstein, 2012; Goldstein, 2023). The *Feedback* channel therefore predicts that changes in short-selling capacity can affect stock prices and, through price feedback, propagate into real decisions.

Channel 2: Disciplining. While the *Feedback* channel operates through the effects of short selling on stock prices and subsequent real decisions, the *Disciplining* channel operates directly through managerial incentives and can thereby mitigate firms' agency problems. The latter does not require a realized price effect, because the anticipation of short selling can itself change managerial behavior. The theoretical foundation of this channel comes from the governance literature on "voice or exit". Hirschman (1970) distinguishes between attempting to change an organization through voice and responding by exiting it. In financial markets, Admati and Pfleiderer (2009) show that the threat of exit can discipline management even without an actual sale, because managers who are compensated in equity internalize the price impact of an anticipated departure. Edmans (2009) develops a related mechanism in which informed trading by a blockholder improves price efficiency and thereby disciplines a manager whose incentives depend on the stock price. Edmans and Manso (2011) extend this analysis to multiple blockholders trading strategically against one another.

Short selling adds a distinct governance instrument in addition to voice and exit, and an unusual one: the party exercising it need not have owned the security beforehand. An outsider who discovers misconduct can establish a short position and profit from its correction, whether or not she was ever a shareholder. This can have real effects even without any actual increase in short-selling activity because it operates through managers' anticipation of the threat:

$$\text{Misconduct} \rightarrow \text{probability of detection and short-selling attack} \uparrow \rightarrow \text{expected price decline and managerial cost} \uparrow$$

Anticipating this, managers facing greater short-sale exposure respond ex ante:

$$\text{Short-selling capacity} \uparrow \rightarrow \text{expected cost of misconduct} \uparrow \rightarrow \text{misconduct} \downarrow$$

The distinction between realized short selling and the capacity or threat of short selling is central to this channel.

Channel 3: Competition. The third channel operates on other agents, such as an existing blockholder or a corporate insider, through competition for economic rents. Absent short selling, an incumbent informed party retains more of the rent from her information. Greater lending supply allows additional informed short sellers to enter:

$$\text{Lending supply} \uparrow \rightarrow \text{capacity for informed short sellers to enter} \uparrow \rightarrow \text{competition for informational rents} \uparrow$$

For an incumbent blockholder, this competition erodes the profitability of exit relative to intervention, raising the relative attractiveness of governance:

$$\text{Rents from exit} \downarrow \rightarrow \text{relative return to voice} \uparrow$$

For a corporate insider holding the same kind of private information, the analogous response is not a shift toward governance but a shift in the timing and scale of trading. An insider who anticipates future competition from short sellers has an incentive to trade earlier and more aggressively, before that competition materializes. This generates two predictions:

$$\text{Short-selling potential} \uparrow \rightarrow \text{fraction of existing stake sold earlier} \uparrow$$

$$\text{Short-selling potential} \uparrow \rightarrow \text{the time span duration of insider selling} \downarrow$$

This competition can take different forms and change the incentives of other informed agents.

Channels 1 and 3 share a common formal mechanism when short sellers are informed. Writing $N(L)$ for the number of informed traders able to trade when lending supply is L, with $N'(L) > 0$, the Kyle (1985) and Holden and Subrahmanyam (1992) logic implies

$$\partial I(P;V)/\partial N > 0, \quad \partial \Pi(P;V)/\partial N < 0,$$

where $I(P;V)$ is price informativeness and $\Pi(P;V)$ is an individual informed trader's expected informational rent. Greater informed competition therefore has two consequences. It makes prices more informative, which can generate price feedback through Channel 1, while reducing the rents of incumbent informed agents, which is the mechanism emphasized by Channel 3. These are two properties of the same equilibrium rather than separate assumptions.

Channels 2 and 3 are also related because both can change behavior before any short sale is observed. The distinction is in whose behavior changes, and why. Channel 2 asks how the threat of short selling disciplines the manager, who reacts to an external threat of exposure. Hence, it changes the incentives and decisions of *the manager*. Channel 3 asks more broadly how the presence and behavior of short sellers change the incentives and decisions of *other agents*. The choice between trading now and trading later and the choice between voice and exit provide two important examples of this mechanism. The same logic can also be extended to information

acquisition: competition can affect not only how existing information is used, but also the private incentive to acquire information in the first place.

Channel 4: Lender Incentive. The first three channels ask what securities lending allows a borrower to do. The fourth reverses the perspective and asks how securities lending changes the incentives and decisions of the security owner. The theoretical literature increasingly treats the lending market as an equilibrium involving both borrowers and lenders rather than taking lending supply as fixed. Duffie, Gârleanu, and Pedersen (2002) model lending fees through search and bargaining. Blocher, Reed, and Van Wesep (2013) connect the lending and cash markets, and Kolasinski, Reed, and Ringgenberg (2013) study search frictions within the lending market itself. Atmaz, Basak, and Ruan (2024) develop a dynamic equilibrium of borrowing demand, lending supply, fees, and prices. Sikorskaya (2026) goes one step back. She shows that lender ownership is itself endogenous to institutional demand. The *Lender Incentive* channel builds on this literature by asking how incentives created in the securities-lending market extend beyond that market to affect portfolio and governance decisions in the cash market and corporate financing decisions in the real economy.

A key premise of the *Lender Incentive* channel is that security lenders are not necessarily passive suppliers of inventory. They may instead actively choose whether, when, and how much to lend, learn from borrowing demand, and adjust their portfolio and governance decisions in response to lending-market conditions.

One important mechanism arises because the same institutional investor can be both the security lender and a cash-market investor in the security. If lending generates a benefit beyond the security's conventional investment value, the value of security j to lender-investor i can be written as

$$V_{ij} = V_{ij}^{\text{Investment}} + B_{ij}^{\text{Lending}},$$

where $V_{ij}^{\text{Investment}}$ is conventional investment value and B_{ij}^{Lending} is the additional lending-related benefit. The existence of this additional lending-related benefit may affect the investor's optimal holding. If q_{ij} denotes the investor's optimal holding, we may have

$$\partial q_{ij} / \partial B_{ij}^{\text{Lending}} > 0.$$

An increase in the lending-related benefit therefore raises that investor's demand for the security, independently of any view about its fundamentals. If so, this additional demand could generate real effects through its influence on security prices and the cost of issuing such securities:

$$\text{Lending-related benefit} \uparrow \rightarrow \text{lender-investor demand} \uparrow \rightarrow \text{price} \uparrow \rightarrow \text{issuer's cost of capital} \downarrow \rightarrow \text{issuance of similar securities} \uparrow$$

This portfolio-demand mechanism illustrates one application of the *Lender Incentive* channel. As discussed in Section 2.1, lenders may also learn from borrowing demand, and lending or recalling securities can alter their governance decisions.

2.3 Two-Sided Securities-Lending Market and Its Informational Foundation

The distinction between the first three channels and the fourth highlights two important features of the securities-lending market: it has both a borrower side and a lender side, and the real effects operating through these two sides need not have the same economic origin. Having developed the four channels, we now briefly review the informational foundation underlying the first three and contrast it with the different economic foundation of the lender-side channel.

A common origin of the real effects operating through the first three channels is that short sellers possess, process, or can act on information that the market does not yet fully reflect. We therefore briefly summarize the evidence establishing this informational foundation. Because the broader literature on informed short selling has already been extensively reviewed by Reed (2013) and Jiang, Habib, and Hasan (2022), we refer readers to these surveys for more comprehensive treatments.

Early studies examine whether aggregate short interest is informative. The evidence is generally mixed because aggregate short interest may reflect several distinct motives, including negative information, tax positions, index arbitrage, and hedging, that are difficult to separate without transaction-level data. Seneca (1967) relates market-wide short interest to subsequent returns without a clear directional finding. Brent, Morse, and Stice (1990) emphasize the non-informational motives behind much short selling. Senchack and Starks (1993) find only modest price reactions to short-interest announcements. In contrast, the cross-sectional and transaction-

level evidence that followed is considerably more decisive. Aitken, Frino, McCorry, and Swan (1998) show that short sales on the Australian Stock Exchange are followed almost instantaneously by negative returns. Desai, Ramesh, Thiagarajan, and Balachandran (2002) show that heavily shorted Nasdaq stocks underperform. Asquith, Pathak, and Ritter (2005) find the same pattern in a broader sample. Diether, Lee, and Werner (2009) show that daily short-selling flow predicts returns out of sample. More recently, Jiao, Massa, and Zhang (2016) use hedge fund holdings and short-selling data to show that observed short selling can reflect both informed demand and hedging demand.

A second body of work asks where this predictive power comes from, which matters here because a real effect requires that short sellers convey information the market would not otherwise process in a timely way. Dechow, Hutton, Meulbroek, and Sloan (2001) show that short sellers target firms with low ratios of fundamentals to price, consistent with the use of valuation analysis. Christophe, Ferri, and Angel (2004) document elevated short selling ahead of disappointing earnings announcements. Karpoff and Lou (2010) find that abnormal short interest rises steadily in the months before financial misconduct is publicly revealed, hastening the discovery of fraud. Engelberg, Reed, and Ringgenberg (2012) find that the predictive power of short selling is roughly twice as large on news days and four times as large on days with negative news. Their interpretation is that short sellers are skilled processors of public information rather than possessors of leaked private information. Boehmer, Jones, Wu, and Zhang (2020) find evidence of both public-news processing and private information around fundamental events. Boehmer, Huszar, and Jordan (2010) show that the absence of short interest is itself informative. Daske, Richardson, and Tuna (2005), by contrast, find no abnormal short selling before bad-news events in their sample, a reminder that aggregate flow is noisier than the informed component within it. Overall, the evidence supports the premise: short sellers are informed, and their trades carry information into prices.

The lender side starts from a different premise. Channel 4 does not require security lenders to possess superior information about firm fundamentals. Lenders can respond to information from borrowing demand, but they can also respond simply because lending changes the economic

benefit of owning the security or because lending and recall affect the ownership rights available to them. This distinction is particularly useful in corporate bonds, where informed short selling appears more limited than in equities (e.g., Asquith, Au, Covert, and Pathak, 2013; Hendershott, Kozhan, and Raman, 2020) and borrowing can reflect dealer intermediation, inventory management, market-making needs, and other institutional considerations (e.g., Foley-Fisher, Narajabad, and Verani, 2019; Goyal, Nozawa, and Qiu, 2026).

The two sides are nevertheless connected. Borrowers' willingness to short depends on expected mispricing, borrowing costs, and the availability of lendable securities. In contrast, lenders' willingness to supply securities depends on lending revenue, portfolio considerations, governance objectives, and other considerations. Existing theoretical models, such as Duffie, Gârleanu, and Pedersen (2002), Blocher, Reed, and Van Wesep (2013), and Kolasinski, Reed, and Ringgenberg (2013), formalize different aspects of this interaction. However, these models focus primarily on trading, prices, and lending-market outcomes. How the interaction between borrowers and lenders ultimately affects real economic decisions remains much less explored.

3. The Borrower Side: Short Sellers and Real Effects

Having established the informational role of short sellers, we now examine the empirical evidence on their real effects. We begin with the *Feedback* channel, in which short selling affects stock prices and those price changes feed back into real decisions. We then turn to the *Disciplining* channel, in which the threat of short selling changes managerial incentives. Finally, we examine the *Competition* channel, in which short sellers affect the incentives and decisions of other agents.

3.1 Feedback: Price Feedback and Real Decisions

The *Feedback* channel operates in two stages. Short selling first affects stock prices. These changes in stock prices can then affect investment, financing, and control decisions.

First Stage: Short Selling and Stock Prices

While the evidence summarized in Section 2.3 establishes that short sellers are informed, an important case arises when informed short selling increases price informativeness, allowing decision makers to learn from market prices. The first stage of the *Feedback* channel therefore

asks how short sellers' trading affects stock prices and price informativeness. As we will see, most of the evidence suggests that this channel operates through improved price informativeness, although the literature also raises some important concerns.

The prevailing evidence suggests that short selling generally improves price discovery and allows prices to incorporate information more efficiently. Bris, Goetzmann, and Zhu (2007), studying 46 equity markets, find that prices incorporate negative information faster where short selling is allowed and practiced. Chang, Cheng, and Yu (2007) exploit the Hong Kong designated-list mechanism and find that adding a stock to the shortable list reduces overvaluation, especially when investors disagree. Saffi and Sigurdsson (2011), using international lending-market data, show that stocks with greater lending supply, and hence weaker constraints, exhibit faster price discovery with no accompanying increase in volatility. Boehmer and Wu (2013) find that more heavily shorted stocks track fundamentals more closely and are less prone to extreme overvaluation.

A related literature examines the valuation consequences of short-sale constraints when investors disagree. Building on Miller (1977), this literature argues that prices can become overvalued when pessimistic investors are constrained from short selling. Chen, Hong, and Stein (2002) show that reductions in breadth of ownership predict lower subsequent returns. Diether, Malloy, and Scherbina (2002) similarly find that stocks with greater dispersion in analyst forecasts earn lower subsequent returns. In both studies, short-sale constraints can affect valuation by limiting the incorporation of pessimistic views into prices.

Another related literature asks not whether short selling is possible, but what it costs. Drechsler and Drechsler (2014) document a large "shorting premium": a portfolio long cheap-to-short stocks and short expensive-to-short stocks earns substantial average returns, and well-known cross-sectional anomalies are concentrated among stocks with high shorting fees. Muravyev, Pearson, and Pollet (2025) examine 162 documented anomalies and find that average anomaly returns become statistically indistinguishable from zero once short-sale costs are deducted, and that the anomalies are unprofitable even before fees once the highest-fee stocks are excluded. Together,

these findings suggest that higher short-selling costs can impede arbitrage and allow mispricing to persist, particularly on the short side of anomaly strategies.

One reason short-selling costs can impede price correction is that informed short sellers may not always find it privately optimal to maintain their positions when doing so is costly. Gârleanu, Panageas, and Zheng (2026) model the joint dynamics of spot and lending markets and show that short sellers may abandon positions even as mispricing widens if the cost of maintaining the position rises sufficiently. They also document fat-tailed shorting activity and sudden reversals in stocks that their model identifies as particularly susceptible. The ability to short therefore does not imply that informed traders will always maintain positions until mispricing is eliminated.

However, restrictions on particular forms of short selling need not reduce stock-price informativeness, even though such restrictions can be viewed as increasing the costs of short selling. Kolasinski, Reed, and Thornock (2013) study two restrictions during the 2008 financial crisis: an emergency order that effectively restricted naked short selling for selected stocks and a subsequent ban on short selling of financial stocks in the spot market. Neither restriction eliminated the ability to establish short positions altogether. They find that the informativeness of the remaining short-selling activity increases under the restrictions, although the evidence differs across their measures of informed trading. The authors interpret this evidence as a screening effect: the restrictions disproportionately deter less-informed short-selling activity, increasing the proportion of informed trading among the short selling that remains. Thus, these particular types of short-selling restrictions may not harm stock-price informativeness because of their screening effect.

A caveat to this channel is the possibility of manipulation. Goldstein and Guembel (2008) show theoretically that when firms learn from stock prices, price feedback can create incentives for short sellers to manipulate stock prices. By short selling the firm's stock, they depress its price and induce the firm to reduce investment. The resulting decline in fundamental value can then make the initial short position profitable. They refer to this trading strategy as manipulation. Thus, short selling can generate informative price feedback by incorporating information into prices, but it can also generate manipulative price feedback without improving price informativeness.

Second Stage: Price Feedback and Real Decisions

The second stage asks whether changes in stock prices affect real decisions. This link has been established especially in broader research outside of short-selling studies. Chen, Goldstein, and Jiang (2007) show that corporate investment is more sensitive to stock prices when prices contain more private information, consistent with managers learning from market prices. Edmans, Goldstein, and Jiang (2015) formalize this feedback mechanism, showing how information revealed through trading can improve managerial decisions and affect fundamental value. Edmans, Goldstein, and Jiang (2012) provide related evidence in the market for corporate control. Using mutual-fund redemptions as an instrument for non-fundamental price pressure, they show that price declines unrelated to fundamentals increase the probability of a takeover bid because acquirers respond to the lower market price.

Real Effects of Short Selling through Price Feedback

Grullon, Michenaud, and Weston (2015) provide direct evidence that short-sale constraints can affect corporate financing and investment decisions. Using the Regulation SHO pilot as a natural experiment, they show that relaxing short-sale constraints increases short selling and causes pilot-firm stock prices to decline. Lower stock prices make equity financing more costly or less attractive, leading affected firms to issue less equity and reduce investment. These effects are particularly pronounced among small and financially constrained firms. The evidence therefore supports the notion that the securities-lending market affects corporate financing and investment decisions.

The decline in investment, however, does not by itself establish that short selling improves investment efficiency. For financially constrained firms, lower investment may exacerbate underinvestment; for firms that are overinvesting, however, a reduction in investment may improve investment efficiency.

Chen, Fu, and Wang (2023) address this distinction directly. Using the Regulation SHO pilot, they find that relaxing short-sale constraints mitigates both underinvestment and overinvestment. In particular, the reduction in underinvestment operates through an external-financing channel:

improved price efficiency alleviates financial constraints, allowing constrained firms to invest more. Their evidence therefore illustrates how the securities-lending market can enhance investment efficiency through price feedback. The authors also find that the reduction in overinvestment operates through a managerial-incentive channel, adding to the evidence on the disciplinary effects of short selling that we review in the next subsection (see also Tsai, Wu, and Xu, 2021).

Short-selling-induced downward price pressure can also tighten firms' financial constraints and thereby affect other corporate decisions. Luo, Ni, and Tian (2020) exploit staggered short-sale deregulation in China and find that affected firms increase tax avoidance, particularly when they are financially constrained. The authors argue that downward price pressure from short selling tightens firms' financial constraints, inducing them to use tax avoidance to generate additional internal funds. Thus, short-selling-induced price pressure can affect corporate policies through its impact on firms' financing conditions.

Price feedback also affects corporate decisions in the market for corporate control. Dutordoir, Strong, and Sun (2022) examine how short-selling potential affects the method of payment in mergers and acquisitions. Stock-financed acquisitions expose bidder shares to short selling by merger arbitrageurs. The authors show that bidders with greater ex ante lending supply, and hence greater short-selling potential, use more cash rather than stock in acquisition payments. Their evidence is consistent with bidders anticipating the negative price pressure associated with merger-arbitrage short selling and adjusting the financing of the acquisition in response. This evidence extends the real effects of short-selling-induced price feedback from corporate financing and investment to decisions in the market for corporate control.

3.2 Disciplining and Managerial Incentives

The *Disciplining* channel asks whether the ability of informed short sellers to trade on adverse information can directly affect managerial incentives, particularly by reducing managerial misconduct and other agency problems. The channel starts from the well-documented premise, reviewed in Section 2.3, that informed short sellers identify firms with misconduct or poor

fundamentals (Dechow, Hutton, Meulbroek, and Sloan, 2001; Karpoff and Lou, 2010). Desai, Krishnamurthy, and Venkataraman (2006) find that short sellers build positions before earnings restatements, particularly among firms with high accruals, while Hirshleifer, Teoh, and Yu (2011) show that short arbitrage is concentrated among high-accrual firms. Bushman and Pinto (2024) further show that short selling increases negative press coverage, providing another mechanism through which short sellers can make unfavorable corporate behavior more visible.

The new insight proposed by the *Disciplining* channel is that, recognizing the potential for such attacks, managers may change their behavior even before an attack actually occurs. The threat of short selling can therefore directly discipline managerial incentives without requiring an actual increase in short-selling activity or a realized price effect. The effect is similar to "the dog that did not bark" in Sherlock Holmes' stories. The empirical literature examines this disciplinary effect across a broad range of corporate activities and decisions.

Disciplinary Effects

The evidence is particularly strong for financial reporting. Massa, Zhang, and Zhang (2015) use the supply of lendable shares as a proxy for short-selling potential. Greater lending supply is associated with less earnings management, with stronger effects where alternative governance mechanisms are weak. The pattern holds both in the US and internationally. Their findings are consistent with short-selling potential acting as an external disciplinary mechanism that becomes particularly important when other governance mechanisms are less effective. Similarly, Fang, Huang, and Karpoff (2016) document that firms where the potential of short-selling is higher engage in significantly less earnings management. Overall, these results suggest that greater short-selling capacity can deter misreporting by strengthening external discipline on managers.

Chen and Wu (2021) examine whether managers respond to greater short-selling threats by substituting real activity manipulation for accrual-based earnings management. They find that the short-selling threat also reduces real activity manipulation. Together with the previous evidence on accrual-based earnings management, their results suggest that the disciplinary effect is not simply offset by substitution from accrual-based to real activity manipulation.

The disciplinary effects extend beyond financial reporting. He, Ren, and Tian (2025) find that relaxing short-sale constraints improves the quality, value, and efficiency of firms' innovation activity and identify short sellers' patenting-related litigation as a possible mechanism. Chang, Lin, and Ma (2019) use equity lending supply to proxy for short-selling threat and find that acquirers with greater lending supply earn higher announcement returns, with the effect concentrated in deals prone to agency problems. Lin and Yu (2026) extend this evidence using the Regulation SHO pilot and find that the short-selling threat reduces value-destroying mergers and acquisitions and improves deal quality, with stronger effects among firms with greater agency problems and higher CEO incentive pay. Ni and Xu (2023) find that the short-selling threat reduces corporate default risk, suggesting that the *Disciplining* channel can also affect firms' overall risk.

Tax avoidance provides another illustration of the disciplinary effect, although firms may have more complex incentives to engage in tax avoidance than those captured by the *Disciplining* channel alone. Maharjan, Omer, and Zhao (2025), using the Regulation SHO pilot, find that the short-selling threat reduces extreme tax avoidance, consistent with greater external monitoring. Cao, Dong, Guo, and Ma (2022) similarly find that short-selling deregulation discourages aggressive tax avoidance. These findings point to a disciplinary effect of short selling. It is worth noting that they differ from Luo, Ni, and Tian (2020), discussed in Section 3.1, who find that short-sale deregulation increases tax avoidance. Luo, Ni, and Tian interpret greater tax avoidance as a response to financing pressure: firms use tax avoidance to generate internal funds when short-selling-induced downward price pressure tightens financial constraints. Thus, while these studies examine the same corporate policy, the underlying mechanisms, and even the direction of the effects, differ. This suggests that short selling may impact the corporate decisions of the firms in several different ways.

Strategic Adaptation

A related but distinct response to short-selling threats is "*strategic adaptation*." While the disciplinary effect refers to changes in managerial behavior that mitigate existing agency problems, firms may also respond to short-selling threats by adjusting their internal contracts, governance,

or other practices without a clear reduction in agency problems. We refer to these responses as strategic adaptation.

De Angelis, Grullon, and Michenaud (2017) provide evidence of such adaptation. Using the Regulation SHO pilot, they document two responses. First, boards increase the convexity of executive compensation, granting relatively more stock options in place of restricted stock. Second, firms become more likely to adopt anti-takeover provisions. The authors interpret these responses as firms adjusting managerial incentives and job protection in response to greater exposure to short-selling attacks. The implications for agency problems, however, remain unclear. Greater compensation convexity can encourage managerial risk-taking, while stronger anti-takeover protection provides managers with greater job security but may also increase managerial entrenchment.

Interestingly, Bui, Hasan, Lin, and Nguyen (2023) document a related consequence in the banking sector. They find that the short-selling threat increases bank risk-taking during the financial crisis and interpret this increase as mitigating excessive managerial conservatism. Under this interpretation, the increase in compensation convexity documented by De Angelis, Grullon, and Michenaud (2017) could also be interpreted as a disciplinary effect by encouraging managers to take more risk. De Angelis, Grullon, and Michenaud (2017), however, do not directly examine the overall agency implications of these contractual and governance adjustments.

Managers can also adapt by changing the way they disclose information. Li and Zhang (2015) use the Regulation SHO experiment and find that greater short-selling pressure reduces the precision of bad-news management forecasts and lowers the readability of bad-news sections of annual reports, while leaving good-news disclosures relatively unchanged. Thus, although greater short-selling capacity can reduce earnings management, as the evidence above shows, it can also induce managers to obscure unfavorable information along other disclosure dimensions.

Taken together, these studies illustrate an important distinction. Short-selling threats can discipline managers by mitigating existing agency problems, but they can also induce firms and managers to adapt their contracts, governance, and disclosure practices. The latter responses do

not necessarily have clear implications for agency problems and therefore should not automatically be interpreted as disciplinary improvements.

Regulation SHO as a Common Empirical Laboratory

A substantial part of the evidence above, as well as other related analyses of short selling, relies on the Regulation SHO pilot. The commonly used design compares firms randomly selected into the pilot program, for which the Securities and Exchange Commission (SEC) suspended the uptick rule during the pilot period, with unaffected non-pilot firms. This design is useful because it provides plausibly exogenous variation in short-selling capacity, but it also means that findings across different corporate outcomes should not automatically be viewed as independent evidence from different shocks.

Black, Desai, Litvak, Yoo, and Yu (2024) reassess several studies that use the Regulation SHO pilot to identify indirect corporate effects of short selling and show that some reported effects are sensitive to empirical specification and sample construction. Boehmer, Jones, and Zhang (2020) show that standard difference-in-differences estimates can understate treatment effects because short sellers became more aggressive even in control stocks after the repeal of the uptick rule, affecting the comparison group. Zhao, Fayissa, and Homaifar (2021) find that short-sale informativeness on the NYSE declined for pilot stocks during the pilot period and attribute this pattern partly to investor responses to regulatory attention. These observations do not invalidate Regulation SHO as a useful source of exogenous variation. However, they call for greater care in interpreting the robustness, independence, and causal meaning of the resulting evidence.

Taken together, the studies reviewed in this subsection show that changes in short-selling capacity can directly affect managerial incentives without requiring a realized short-selling attack or price effect. Some responses mitigate existing agency problems, while others represent strategic adaptations whose implications for agency problems are less clear.

3.3 Competition: Changing Other Agents' Incentives

The *Competition* channel asks how short sellers change the incentives and decisions of other informed agents. Its central insight is that short selling changes not only the information contained

in prices, but also the private value of possessing information in the first place. When multiple informed agents can trade on related information, competition from short sellers can change the informational rents available to other informed agents and thereby affect how they acquire, use, and trade on information.

Such competition can take different forms. Informed agents may compete directly for trading profits, respond strategically to the threat posed by other informed traders, or obtain and trade on information produced by others. More broadly, competition may create a tension between the private value of informed trading and the public value created when private information is incorporated into prices.

Insider Trading and Direct Competition

The literature has applied the direct competition mechanism most fully to corporate insiders. An insider with private information faces a trade-off between spreading sales over time to limit price impact and selling earlier to avoid future competition. If the insider expects informed short sellers to obtain related information and enter the market later, waiting becomes more costly because competition reduces the informational rent available from trading. Greater short-selling potential can therefore induce the insider to exploit her information before competition increases.

This mechanism generates two predictions. Greater short-selling potential should increase the fraction of the insider's existing stake sold earlier, because front-loading becomes more valuable. It should also shorten the duration of insider selling, because waiting exposes the insider to greater informed competition. Massa, Qian, Xu, and Zhang (2015) test both predictions and find support for each: greater lending supply is associated with a larger fraction of insider stakes sold and a shorter selling duration.

Subsequent studies show that insiders can respond to short sellers along additional dimensions. Chen, Cheng, Luo, and Yue (2022) use the Regulation SHO pilot and find that relaxing short-sale constraints reduces insider-trading profitability, particularly when information quality is poor and firms lack strong internal restrictions on insider trading. These findings are consistent with the

broader idea that greater short-selling capacity changes the private value of insiders' information and therefore their trading strategies.

The interaction need not, however, operate only through direct competition for trading rents. Wang, Wang, Wei, Zhang, and Zhou (2022) use the Regulation SHO pilot, together with short-selling deregulation in China and Hong Kong, and find that a greater short-selling threat reduces opportunistic insider selling while increasing profitability per transaction. They interpret these findings as evidence that short sellers discipline opportunistic insider trading. These results differ from both the preemptive-trading response emphasized by Massa, Qian, Xu, and Zhang (2015) and the decline in insider-trading profitability documented by Chen, Cheng, Luo, and Yue (2022). However, it is worth noting that the empirical settings and measures of insider behavior differ across these studies, giving rise to different interpretations. For instance, the shorter selling duration predicted by Massa, Qian, Xu, and Zhang (2015) is more closely tied to preemption than a generic increase or decrease in insider-selling volume. Taken together, these studies suggest that short selling may affect insider behavior through different mechanisms and along different dimensions.

Contreras, Fidrmuc, and Kozhan (2026) provide another qualification. In the post-Sarbanes-Oxley Act (SOX) period, they find little evidence that insiders profit primarily from foreknowledge of material information, but find that insiders can profit from short-term mispricing associated with short-selling activity. In the earlier pre-SOX period, insiders appear to trade more directly on foreknowledge. The precise source of competition between insiders and short sellers can therefore differ across regulatory environments.

Broader Interactions among Informed Agents

The same basic logic that has been applied to corporate insiders can extend to other market participants. An informed blockholder who observes a value-destroying managerial action can either intervene through governance or profit by selling before the information is fully incorporated into price. Competition from informed short sellers reduces the informational rent available from exit and can therefore increase the relative attractiveness of governance. Massa, Zhang, and Zhang

(2015), discussed in Section 3.2, develop and test this implication using lending supply as a proxy for short-selling potential. They find that greater lending supply is associated with less earnings management, particularly where alternative governance mechanisms are weak. Viewed through the *Competition* channel, the evidence is consistent with short-selling competition changing the relative value of informed exit and governance. The empirical evidence for this particular exit-versus-governance mechanism, however, remains considerably more limited than that for insider trading.

The intuition can be extended further, even to settings in which short sellers are not themselves one of the competing informed agents. Jeon and Sulaeman (2024) study competition between corporate insiders and options-market participants and find that insider purchases are less frequent and less informative in stocks with active options trading. Their evidence suggests that sufficiently informed competing traders can reduce an incumbent informed trader's informational rents and change her behavior. In this sense, short sellers represent one important source of informed competition within a broader market in which different informed agents compete over the private value of information.

The *Competition* channel is broader than direct competition for trading rents. Short sellers can also alter the incentives of other agents by changing the informational or economic environment in which they make decisions. The affected agents need not be traders. Hope, Hu, and Zhao (2017) use the Regulation SHO pilot and find that auditors charge higher fees to pilot firms when short-selling threats increase. They interpret the evidence as showing that short-selling threats can affect auditors through greater perceived risk. Ke, Lo, Sheng, and Zhang (2023) find that easier short selling improves analyst forecast quality by reducing forecast bias and increasing forecast accuracy. They attribute the improvement to both disciplinary pressure from short sellers and faster incorporation of information into prices. These studies broaden the *Competition* channel by showing that short-selling capacity can also change the incentives and behavior of information intermediaries who are not themselves competing directly for trading rents.

Also, interactions among informed agents need not always involve independently acquired information. Khan and Lu (2013) find that short selling increases before large insider sales and

provide evidence consistent with short sellers receiving information about upcoming insider sales before they become publicly observable. Christophe, Ferri, and Hsieh (2010) similarly document informed short selling before analyst downgrades. These findings point to information leakage or free-riding as another form of interaction among informed agents. Rather than independently acquiring the same information and competing to trade on it, one informed agent may obtain or infer information originating with another. Such information transmission changes the identity of who captures the private value of information and complicates the simple model of head-to-head informed competition.

Taken together, these studies suggest a broader interpretation of the *Competition* channel. Direct competition for informational rents provides a clean benchmark: the arrival of another informed trader – the short-seller – reduces the private return to exploiting a given piece of information. But informed agents can respond strategically in different ways. They may trade earlier, alter the execution of their trades, substitute governance for exit, change their behavior in response to disciplinary pressure, or lose part of their informational advantage through leakage to other traders. What unifies these responses is that the presence and behavior of other informed agents change the private value of processing and acting on information for a focal informed agent.

Information Production: Private versus Public Value

Greater competition among informed traders can accelerate the incorporation of information that has already been produced into prices. But the same competition, by eroding the rent available to any individual informed trader, can also weaken the ex ante incentive to acquire costly information in the first place. Informed competition can therefore affect both the incorporation of existing information into prices and the private incentive to produce or acquire information. This naturally raises a largely understudied question about the potential tension between the private value of informed trading and the public value created when private information is incorporated into prices.

Recent empirical work begins to examine the information-acquisition margin. Su, Wong, Xue, and Zhao (2025) use short-sale experiments to show that relaxing short-sale constraints increases

investors' acquisition of public information and improves their short-selling decisions. Chen, Kelly, and Wu (2020), in a related setting outside securities lending, show that hedge funds increase information acquisition and trade more aggressively following exogenous reductions in analyst coverage, partially substituting for the lost public information. Although their study does not directly examine short sellers, hedge funds are an important source of short-selling activity, making their evidence informative about how sophisticated investors adjust information acquisition when the information environment changes. Together, these studies suggest that the information available to informed traders and their ability to trade on it can affect their incentives to produce or acquire information.

The existing evidence, however, provides only limited guidance on the broader consequences of these private incentives. Information acquisition is privately valuable because informed investors can earn trading rents from it, while its incorporation into prices can create broader value by improving the information available to other market participants and firms. Competition can alter both margins, and the two need not move together. Understanding how securities lending affects this relationship between the private value of information and its public value through price discovery and real decisions therefore remains an important open question. Section 5 discusses this issue further and asks how the private incentives of informed investors relate to the broader economic effects of securities lending.

This completes the three borrower-side channels. Section 4 turns to security lenders and the real effects that arise from their lending incentives.

4. The Lender Side: Security Lenders and Real Effects

The first three channels developed in Section 3 examine real effects originating primarily from short sellers. This section turns to the other side of the securities-lending market and asks how the incentives and decisions of security lenders can generate real effects. Corporate bonds provide a particularly useful setting because informed short selling appears to play a more limited role than in equities, while major security lenders are also important cash-market investors. We therefore

use the corporate-bond market to introduce the *Lender Incentive* channel and shift attention from short sellers to security lenders.

4.1 Securities Lending in the Corporate Bond Market

The equity paradigm developed in Section 3 does not transfer cleanly to corporate bonds. The point is not that informed short selling is absent from bond markets, but that the relative importance of borrower-side information versus lender-side incentives shifts substantially across the two markets. Indeed, Asquith, Au, Covert, and Pathak (2013) document that borrowing securities in the corporate-bond market is comparatively little motivated by informed short selling relative to equities.

This distinction concerns short selling in the corporate-bond market itself, rather than whether equity short sellers produce information relevant to bond investors. Kecskés, Mansi, and Zhang (2013), for example, show that equity short interest predicts credit-rating downgrades and corporate-bond yield spreads. Thus, information produced by equity short sellers can be valuable in the bond market.

By contrast, short selling in the corporate-bond market appears to contain less information than in equities. Hendershott, Kozhan, and Raman (2020) show that bond short selling does contain information about corporate bonds, but its predictive power is largely confined to speculative-grade issues, with comparatively little informational content in the investment-grade segment that dominates the market by outstanding value. Goyal, Nozawa, and Qiu (2026) reach a similar conclusion from the composition of borrowers, finding that corporate-bond borrowing is driven substantially by dealers' market-making activity rather than solely by informed speculation. Foley-Fisher, Narajabad, and Verani (2019) study the lender side and show that life insurers use securities lending as an important source of wholesale funding. Hence, while borrower-side information remains relevant in corporate bonds, lender-side incentives are comparatively more important for understanding the role of securities lending in this market.

4.2 From Lender Incentives to Corporate Real Effects

Consider an institutional investor who simultaneously chooses how much of a bond to hold and how much of her holding to make available for lending. In corporate bonds, the same institutions that supply lendable inventory, insurance companies prominent among them, are also major cash-market investors in the same securities. This dual role is the structural feature on which the lender-investor mechanism depends:

security lender = cash-market investor.

If lending generates a benefit to the lender beyond the conventional investment payoff, the value of holding a bond to this dual lender-investor can be written as

$$V_{ij} = V_{ij}^{\text{Investment}} + B_{ij}^{\text{Lending}}.$$

Here, $V_{ij}^{\text{Investment}}$ is the conventional investment value of security j to investor i, while B_{ij}^{Lending} captures the incremental benefit associated with lending the security. An increase in lending benefits raises the total value of holding the security to the lender-investor and may therefore increase her demand for the security. Because the lender is also a cash-market investor, this change in demand may affect the issuer's financing conditions and ultimately its real decisions.

Insurance companies illustrate why B_{ij}^{Lending} need not be an incidental addition to investment value. For these long-horizon investors, long-term bonds can be particularly attractive for securities lending for two complementary institutional reasons. First, statutory accounting rules make selling investment-grade bonds relatively costly. For example, Bai, Massa, Yang, and Zhang (2026) argue that this cost is particularly high for long-term investment-grade bonds.[1] Second, conditional on lending, long-term bonds can provide greater benefits from collateral management. The cash collateral received from securities lending can be reinvested to support asset-liability management and yield enhancement, two motives emphasized by industry practitioners

[1] Under statutory accounting, investment-grade bonds held by insurers are generally carried at amortized cost (Ellul, Jotikasthira, Lundblad, and Wang, 2015; Khan, Ryan, and Varma, 2019). Selling a bond below book value realizes a loss that reduces statutory surplus and regulatory capital (Ellul, Jotikasthira, Lundblad, and Wang, 2015), while the Interest Maintenance Reserve spreads realized gains over the bond's remaining maturity rather than recognizing them immediately (Eastman, Kim, and Ragin, 2025). The opportunity cost of selling therefore increases with remaining maturity (Eastman, Kim, and Ragin, 2025).

(JPMorgan, 2006), as well as to relax balance-sheet constraints (Foley-Fisher, Narajabad, and Verani, 2019). Because longer-maturity bonds support longer and more stable lending-and-reinvestment positions, these benefits can be greater for long-term bonds.

Bai, Massa, Yang, and Zhang (2026) document evidence consistent with the *Lender Incentive* channel. They find that stronger lender preference for long-term bonds predicts higher subsequent bond prices and lower yields. This price impact lowers firms' cost of debt, allowing them to take advantage of the favorable financing conditions by issuing more long-term bonds subsequently.[2] Such real effects do not require lenders to possess superior information about firm fundamentals. Instead, the benefits from securities lending suffice to affect dual lender-investors' demand for bonds, which subsequently affects bond prices and firms' financing conditions.

Cross-sectional relations between lendability and prices cannot alone rule out omitted bond or issuer characteristics. Bai, Massa, Yang, and Zhang (2026) therefore exploit a 2010 disclosure reform by the National Association of Insurance Commissioners (NAIC) that required insurers to report securities-lending activity and collateral reinvestment. Because the additional disclosure requirement makes securities lending more costly, the reform reduces the net benefits of securities lending to insurers and thereby provides plausibly exogenous variation in their lending incentives and bond demand. Bai, Massa, Yang, and Zhang (2026) find that the reform reduces lending supply and lending volume, increases lending fees and bond yields, and reduces the probability of long-term bond issuance. Each effect runs in the predicted direction. This creates a useful parallel between Regulation SHO as a borrower-side shock in the equity market and the NAIC disclosure reform as a lender-side shock in the corporate-bond market.

The broader insurance literature suggests additional sources of variation that may be useful for identifying lender-side effects. Ge and Weisbach (2021) and Ge (2022), for example, use insurers' exposure to unusual weather damages to generate exogenous variation in insurers' financial

2 Bai, Massa, Yang, and Zhang (2026) also provide preliminary evidence on the use of bond proceeds. Firms issuing bonds carrying a lendability premium do not appear to use the proceeds primarily for capital investment; instead, the proceeds are associated with greater cash holdings and shareholder payouts. Because these firm-policy results do not have the same identification as the issuance tests, they should be interpreted as suggestive rather than causal.

conditions, studying its effects on portfolio choices and insurance pricing, respectively. Similar shocks could potentially be used to examine whether changes in insurers' financial conditions affect securities-lending supply and, through the dual lender-investor role, security prices and corporate decisions. To our knowledge, this identification strategy has not yet been explored in the securities-lending literature, although the exclusion restriction would need to be carefully examined because insurer financial conditions can affect portfolio choices through channels other than securities lending.

Taken together, the evidence from corporate bonds broadens the securities-lending literature beyond the traditional focus on short sellers. Security lenders are not passive suppliers of inventory. Their lending incentives can change the value they attach to securities, alter their cash-market demand, affect security prices and financing costs, and ultimately influence corporate financing decisions. The *Lender Incentive* channel therefore completes the set of real-effects channels developed in this survey.

4.3 Beyond Corporate Bonds: Security Lenders in the Equity Market

Whereas the corporate-bond evidence examines how securities-lending incentives affect firms' financing, cash holdings, dividends, and investment decisions, existing evidence on the corporate real effects of equity lending has focused primarily on corporate governance. For example, Aggarwal, Saffi, and Sturgess (2015) show that institutional investors restrict lending supply around shareholder votes, particularly when voting rights become more valuable. Their evidence suggests that securities-lending decisions can interact directly with corporate governance, providing an equity-market counterpart to the real effects documented in corporate bonds.

Beyond governance, however, the equity literature provides relatively little evidence on other corporate real effects of lenders' securities-lending decisions. Existing studies instead provide substantial evidence that equity lending supply and demand affect securities-lending-market outcomes and stock prices.

Kaplan, Moskowitz, and Sensoy (2013) use a randomized experiment that varies the supply of lendable shares and find that exogenous changes in lending supply affect lending fees and

quantities. Cohen, Diether, and Malloy (2007) provide a framework for separating shifts in lending supply from shifts in short-selling demand using lending fees and quantities. They show that increases in short-selling demand contain negative information about future stock returns, illustrating how conditions in the securities-lending market can be related to subsequent stock prices.

Beyond aggregate lending supply, the institutional structure of the lending market also matters. Kolasinski, Reed, and Ringgenberg (2013), using proprietary data from 12 lending-market participants, show that search frictions generate substantial dispersion in equity lending fees across lenders, with fee dispersion increasing when lendable shares are scarce and search frictions are greater. Dong and Zhu (2022) provide position-level evidence that short sellers repeatedly borrow from a relatively small set of lenders. Furthermore, the exit of existing lenders can be difficult to replace, causing lending fees to rise and limits to arbitrage to tighten. Lending supply therefore depends not only on its aggregate quantity, but also on the structure and substitutability of the institutions supplying lendable securities.

Sikorskaya (2026) uses the annual Russell index reconstitution to show that institutional mandates affect both ownership and securities lending. Benchmarking increases lending supply, but it also raises shorting demand, with the demand effect dominating in lending fees. The evidence therefore illustrates how institutional ownership can jointly affect lending supply and borrowing demand. Chen, Kaniel, and Opp (2026) develop a theoretical model that further illustrates how market power and custodian intermediation can affect securities-lending-market outcomes.

A related strand examines whether information also flows in the opposite direction, from borrowers to security lenders. Evans, Ferreira, and Porras Prado (2017) show that short-selling demand can provide information relevant to mutual funds' portfolio decisions. They find that funds that lend equities underperform otherwise similar funds and that this underperformance is concentrated among funds that cannot act on the short-selling signal because of investment restrictions. Their evidence therefore suggests an information spillover from borrowers to lenders: borrowing demand can reveal negative information about the securities being lent, which lenders may use in deciding whether to continue holding the underlying security.

Taken together, the equity evidence shows that security lenders are active participants in the securities-lending market. Their lending and portfolio decisions can affect lending supply, lending fees, short-sale constraints, and stock prices, while borrowing activity can itself provide information relevant to lenders' portfolio choices. Yet, beyond the governance evidence, the literature provides relatively little evidence that these lender-side effects extend to other corporate real decisions. This gap stands in contrast to the corporate-bond evidence in Section 4.2 and points to an important direction for future research.

5. Future Research and Broader Implications

Sections 3 and 4 organize the evidence around the four channels in Figure 1. The *Feedback* channel links short selling to corporate decisions through prices and financing conditions. The *Disciplining* channel examines how the threat of short selling changes managerial incentives. The *Competition* channel asks how short sellers affect the incentives and decisions of other agents. The *Lender Incentive* channel examines how security lenders' own considerations and preferences affect lending supply, security demand, governance, and real outcomes. This organization is useful because the existing literature has largely identified these mechanisms one at a time.

The four-channel framework also helps identify where the literature can be expanded. The evidence reviewed above is considerably richer for some links than for others. Under the *Competition* channel, existing studies show that short-selling competition changes the behavior of other agents, but there is relatively limited evidence tracing these responses into subsequent corporate decisions. Similarly, on the lender side, the corporate-bond evidence links lenders' securities-lending incentives to financing and other corporate outcomes, whereas the equity evidence on corporate real effects remains concentrated primarily in governance. A natural extension is therefore to examine whether the *Competition* and equity *Lender Incentive* channels generate real effects as rich as those documented through the other channels.

The four channels also reinforce the importance of viewing securities lending as a two-sided market. A substantial theoretical literature already models borrower demand and lender supply jointly (Duffie, Gârleanu, and Pedersen, 2002; Blocher, Reed, and Van Wesep, 2013; Atmaz,

Basak, and Ruan, 2024). As emphasized in Section 2, however, the real-effects literature has generally identified the different channels one at a time. Future research could integrate the two perspectives by examining how the interplay between lending supply and borrowing demand affects security prices and ultimately corporate decisions. A borrower-side shock may change borrowing demand and lending fees and thereby induce lenders to alter supply, portfolio holdings, recalls, or governance decisions. Conversely, a lender-side shock may change the cost and availability of short positions and thereby affect the *Feedback*, *Disciplining*, and *Competition* channels. More generally, the interaction between lending supply and borrowing demand may generate outcomes that cannot be understood by considering either side in isolation. A joint analysis of the two sides may therefore uncover new predictions about security prices and corporate real effects.

Perhaps the most important open question concerning the real effects of short selling is the tension between its private and public value. The private benefits captured by informed short sellers need not coincide with the public value generated through their real impacts. Indeed, private and public value often diverge. Competition among informed traders can cause information to enter prices more quickly while reducing the informational rent earned by each informed trader (Kyle, 1985; Holden and Subrahmanyam, 1992). Greater informed competition may therefore reduce the private value captured by an individual short seller while increasing the public value generated through price discovery and subsequent real effects. The *Disciplining* channel provides another example: successful discipline may reduce the profitable opportunities available to informed short sellers precisely because the disciplinary mechanism is creating public value.

This tension brings us back to the classical question of what sustains costly information production in financial markets. Private informational rents provide incentives to acquire information in the first place (Grossman and Stiglitz, 1980). In the short-selling setting, Nezafat, Schroder, and Wang (2017) show that short-sale constraints can reduce private information acquisition, and Su, Wong, Xue, and Zhao (2025) find that relaxing short-sale constraints increases investors' acquisition of public information. Easier short selling therefore raises the value of information to investors who can act on negative information. At the same time, the competition

that easier short selling brings can accelerate the incorporation of existing information into prices and erode the rent from any given piece of information, which may weaken the incentive to produce costly information in the first place. Which effect dominates remains an open question. Understanding the real effects of short selling consequently requires understanding not only the public value generated by informed trading, but also the private incentives necessary to sustain it.

This tension also challenges how we quantify the economic role played by short selling. A decline in the private returns to informed short selling, such as lower short-selling profitability, does not necessarily imply a diminished economic role for short sellers. It may instead reflect stronger competition among informed traders, faster incorporation of information into prices, or successful discipline that reduces the opportunities from which short sellers can profit. Private profitability and public economic impact may therefore move in opposite directions. Future research should distinguish more carefully between the private returns earned by informed short sellers and the broader value generated through price discovery, discipline, and corporate real effects.

6. Conclusion

Research on short selling has traditionally focused on whether short sellers are informed and on how short-sale constraints affect prices and market efficiency. The literature reviewed in this survey shows that the consequences extend beyond financial-market prices. Securities lending can affect corporate decisions, managerial behavior, and the incentives and decisions of other market participants. These are real effects in the sense that securities lending enables mechanisms that would be unavailable or substantially weaker, or would operate differently, in its absence.

We organize these effects through four channels: *Feedback*, *Disciplining*, *Competition*, and *Lender Incentive*. The first three describe how the ability to establish short positions can affect prices and corporate decisions through price feedback, alter managerial incentives, and change the incentives and behavior of other agents. The fourth emphasizes that short selling requires security lenders whose own lending and portfolio incentives can affect security prices, financing conditions, governance, and ultimately corporate decisions. Taken together, these channels shift

the perspective from short selling as a trading activity to securities lending as a two-sided financial market with consequences for firms and other economic agents.

The evidence also points to potential directions for future research. One particularly interesting question raised by the real-effects perspective concerns the economic value of informed short selling. The private profitability of informed short sellers need not capture the value they create for other economic agents. Understanding this tension, and how much private return is needed to sustain informed short selling and generate real impacts, could become an important direction for future research.

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