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How Expensive is "Too Expensive"? The Hidden Cost of Short Selling Around Ex-Dividend Days

Mariko Miura

Graduate School of Business Administration,
Hitotsubashi University

Yoshiki Shimizu

Graduate School of Business Administration,
Hitotsubashi University

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The Hidden Cost of Short Selling Around Ex-Dividend Days

Mariko Miura and Yoshiki Shimizu[†]

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Abstract

Short sellers must borrow shares before they execute short sales. In Japan, there is a standardized margin transaction (SMT) system, which is pervasive among retail investors: Over 70 percent of retail investors in Japan use SMTs when initiating short sales. Although SMTs are designed to be widely accessible to retail investors, there may be a pitfall (or hidden cost) – the premium charge rate (PCR, or *Gyaku-hibu*). For a given stock, when the demand for margin selling is high relative to its supply, causing higher procurement costs for brokers, short sellers are charged with a PCR, in addition to conventional borrowing fees. This study examines the effect of PCRs, along with other relevant stock lending costs, on market quality of stocks around ex-dividend days, which the literature identifies as a period of high short selling and stock lending activities. Consistent with the literature, we show that the number of stock lending transactions increased significantly but with more elevated borrowing fees, suggesting that market quality of the securities lending market deteriorates around ex-dividend days. Moreover, we show a significant increase (decrease) in the PCRs, an additional stock borrowing cost, on the cum- (ex-) day, suggesting that the demand-supply imbalance for certain stocks is most pronounced on the cum-day. We also show that the deterioration of market quality in the securities lending market spills over to the stock market.

Keywords: Short selling, Securities lending, Ex-dividend days, Market quality

[†] Mariko Miura and Yoshiki Shimizu are from Hitotsubashi University Business School, Hitotsubashi University, Tokyo, JAPAN. We wish to thank Shunsuke Mori, Ryuichi Yamamoto (discussant), and seminar and conference participants at the QUICK-Hitotsubashi University FS Joint Seminar, the 33rd Annual Meeting of the Nippon Finance Association (NFA), and the FS Faculty Seminar at Hitotsubashi University Business School for their helpful comments and feedback. Please send all comments to the corresponding author, Mariko Miura, at bd23f003@g.hit-u.ac.jp

1. Introduction

The securities lending market plays a crucial role in linking short sellers with securities lenders, facilitating short selling activities and contributing to liquidity and price discovery in the stock market. The literature documents that the market for borrowing stock is closely linked with the stock market, such that liquidity in the former influences that in the latter (D'Avolio, 2002; Duffie et al., 2002; Blocher et al., 2013; Miura, 2025, among others). This connection arises because short sellers must borrow shares before executing a short sale, due to the regulations that restrict naked short-selling.[1] To borrow shares, short sellers typically rely on their broker for the procurement of the shares, and borrowing fees fluctuate based on inventory levels, supply-demand dynamics, and the "*specialness"* of the stock. Thus, the extent to which short sellers contribute to liquidity in the stock market depends on their ability to borrow shares and access to the securities lending market. D'Avolio (2002) shows that borrowing fees tend to increase for stocks with low institutional ownership (a proxy for lending supply), low stock turnover (a proxy for liquidity), among other stock-level characteristics. If a stock is on special (i.e., lendable but hard to locate), short sellers must pay elevated borrowing fees, constraining their ability to execute a short sale in a timely manner and at the price they wish to trade, which respectively slows down price discovery and deteriorates liquidity.

In addition to the firm/stock-level characteristics that influence borrowing fees, the literature documents that borrowing fees tend to spike around ex-dividend days, primarily due to a reduction in the supply of lendable shares (Thornock, 2013, Dixon et al. 2021): Since ordinary

[1] According to the US Securities and Exchange Commission, naked short-selling is defined as: "*In a "naked" short sale, the seller does not borrow or arrange to borrow the securities in time to make delivery to the buyer within the standard settlement period. As a result, the seller fails to deliver securities to the buyers when delivery is due (known as a "failure to deliver" or "fail")*". See https://www.sec.gov/investor/pubs/regsho.htm

dividends are taxed at a lower rate than "*substitute dividends*,[2]" lenders are incentivized to recall shares they had previously lent out before ex-days to avoid higher taxes. This results in a sudden reduction in the supply of lendable shares, leading to a spike in borrowing fees around ex-days. This phenomenon is also observed, or even more pronounced, in the Japanese stock market. As illustrated in Figure 1, the average stock borrowing fee begins to rise sharply about 20 days before the ex-dividend day, peaks on the record day, and then gradually returns to its normal level afterward. The overall pattern of borrowing fees shown in Figure 1 basically mirrors that reported in Dixon et al. (2021); however, we observe that borrowing fees for Japanese stocks are, on average, much higher than those for US stocks.

What makes stock borrowing fees in Japan so expensive? In addition to the conventional borrowing fees, there is an additional fee that is not observed in other markets. This unique fee, which short sellers must be particularly aware of, is known as *the premium charge rate* (PCR, or *Gyaku-hibu* in Japanese). The PCR may be incurred when investors engage in short sales through standardized margin transactions, a widely used means among retail investors. In Japan, there are two types of margin transactions: Negotiable margin transactions (NMTs) and standardized margin transactions (SMTs)[3]. In NMTs, the terms – e.g., repayment schedules, return deadlines, and borrowing fees – are freely determined through direct negotiation between borrowers and lenders. The primary participants in NMTs are large financial institutions and hence NMTs may be less accessible to retail investors, who generally lack creditworthiness and do not place bulk orders. In contrast, SMTs provide retail investors with the ease of access to securities lending, offering

[2] From Thornock (2013, p. 1836): "*If the stock loan is open over the dividend record date, then the short seller repays the value of the dividend to the lender. This payment is called a substitute dividend.*"
[3] For an overview of margin transactions, see the TSE website at https://www.jpx.co.jp/english/equities/trading/margin/outline/index.html

standardized fee structures and margin requirements.[4] According to the Tokyo Stock Exchange (2023), over 70 percent of trades made by retail investors in 2022 are margin trades, demonstrating the pervasiveness of margin trades among retail investors.[5]

Shares borrowed via SMTs are generally subject to a six-month repayment period, while loan terms for those borrowed via NMTs are determined (or negotiated) between the lender and borrower, which can go beyond 6 months. Despite the shorter repayment period, SMTs offer several advantages. The first is its cost advantage: The lending fees for shares borrowed via SMTs are typically a flat rate, and the rate is generally cheaper than lending fee rates under NMTs, which are determined between the lender and borrower. The second advantage is immediacy, which enables investors using SMTs to order short sale executions without pre-borrowing the stock. The aforementioned naked short selling regulations, which require investors to pre-borrow the stock before executing a short sale, may cause search frictions and delay in transaction speed (e.g., unable to locate the stock in a timely manner). Investors using SMTs can initiate short sales immediately without prior borrowing thanks to the centralized role played by Japan Securities Finance (JSF) – "*the only securities finance company in Japan licensed to provide loans for margin transactions business under the Financial Instruments and Exchange Act* (Japan Securities Finance Co., LTD, 2025)." Specifically, JSF maintains a large inventory of lendable shares and is equipped to respond promptly to borrow requests from brokerage firms. As a result, even if shares are not yet borrowed at the time of trade execution, the system ensures that they are secured via JSF by the settlement date. This centralized guarantee mechanism is a unique feature of Japan's

[4] Details on fee structures and margin requirements under SMT and NMT can be found on the Japan Securities Finance website at https://www.taisyaku.jp/english/about/transaction/

[5]See page 4 of the "Overview of Margin Trading System" by TSE (2023), available at https://www.jpx.co.jp/english/equities/trading/margin/outline/tvdivq0000007szb-att/OutlineOfTheMarginTradingSystem.pdf

margin trading system. Given these advantages, individual investors tend to prefer SMTs over NMTs. However, the use of SMTs for short sales does not come without costs – now investors must beware of premium charge rates (PCRs) that may apply under SMTs.

Under what circumstances does a PCR arise? Consider a retail investor initiating a short sale. Under the SMT, the investor places a trade order and deposits the required margin with their broker (securities company, or *Shoken-Gaisha* in Japanese). The broker has the option to source the shares on their own – either through their internal inventory of stock or via the securities lending market – or turn to JSF. When the demand for margin selling is high relative to its supply, JSF hosts an open auction[6] to collect bids from participating institutional lenders. Once the procurement process is completed, the costs incurred throughout the auction process are passed on to all sell–investor as the PCR, making borrowing costs more expensive. As a result, the total borrowing cost for all short sellers is the conventional borrowing fees (which are generally flat rates) plus the PCR, which fluctuate based on the demand and supply of the borrowed stock. When borrowing demand for stock is high and supply is limited, PCR can increase substantially, making short selling significantly more expensive. Moreover, it is important to note that the JSF auction is conducted, and PCRs are determined, on the day *following* the trade date. Thus, an investor who shorts a stock on *day t* faces two overlapping sources of uncertainty. First, on the trade day (*day t*), the investor does *not* know whether the borrowed stock will incur a PCR. Second, the PCR amount – whether high, low, or zero – is *unknown* until the JSF auction concludes on the *following* day (*day t*+1). This unique feature of PCRs in Japan provides an interesting empirical setting to test their impact on market quality in the stock market.

[6] See Securities Finance Times (Issue 370 04 February 2025) for a brief overview of the JSF auctions, available at https://www.securitiesfinancetimes.com/

In this paper, we analyze a sample of publicly-traded Japanese firms with paid dividends during the 2010 – 2021 period to examine whether and how trading activities in the securities lending market influence those in the stock market, while considering the unique borrowing fee only observed in the Japanese lending market. Since PCRs impose additional borrowing costs that are uncertain at the time of trade but will be determined based on supply-demand conditions of the borrowed stock on the following business day, we can test empirically how such uncertain/unexpected borrowing costs influence liquidity in the stock market. The empirical analysis we conduct is threefold. First, we analyze stock lending activities around dividend ex-days in Japan to examine whether Japanese stocks tend to experience higher borrowing fees around the ex-days, which the literature identifies as a period of high short selling volume, stock lending activities, and borrowing fees. Consistent with Dixon et al. (2021), we show that the number of new stock lending transactions increased significantly more and so do borrowing fees around ex-days (from cum-day through dividend record day), compared to other trading days in our sample. These results suggest that the supply of lendable shares likely drops before the ex-day, causing the contraction of supply while the demand may remain high – investors wishing to borrow shares around ex-days must pay elevated borrowing fees before they execute short sales. Moreover, we follow Thornock (2013) to test market quality of the securities lending market by examining whether the likelihood of extreme loan fees (a measure of loan price inefficiency[7]) frequently occurs around ex-days. We confirm that Japanese stocks also experience spikes in loan fees on cum- and ex-days, indicating that market quality in the securities lending market deteriorates

[7] Thornock (2013) describes four dimensions of reduced market quality as: stock mispricing, search frictions, loan price inefficiency, and microstructure frictions. He measures loan price inefficiency in a logit framework by setting the dependent variable, Pr (LOANFEE > 100bp), as a binary variable that equals one if the stock loan fee increases by 100 basis points from the previous day, and zero otherwise.

around this period. In sum, we find that the Japanese securities lending market experiences deterioration in market quality around ex-days – the supply of lendable shares decreases while the demand for new loan transactions increases, leading to higher borrowing fees. As a result, market quality in the security lending market deteriorates.

Next, we turn our focus to the PCRs and examine how they fluctuate around ex-days. Using both logit and linear probability models, we assess the likelihood that a stock will incur a PCR. We show that the likelihood of a PCR is significantly higher on both the cum-day and ex-day compared to non-dividend event days in our sample. Notably, PCRs occur most frequently on the cum-day, with the highest probability observed on this date. We also examine the magnitude of PCRs around ex-days, and find that PCRs increase significantly only on the cum-day, while they decrease sharply on the ex-day. This pattern suggests that the demand-supply imbalance for certain stocks is most pronounced on the cum-day, which we attribute to a particular payout practice in Japan – shareholder perks. In Japan, many firms offer shareholder perks, or shareholder benefit programs,[8] to increase their visibility in public and attract retail investors. To be eligible for these perks, investors must own the stock on the record-day, towards the end of the month, increasing demand for stocks that offer shareholder perks programs. At the same time, demand for borrowing stocks also increases, as a sizable number of retail investors engage in cross trades – a strategy that simultaneously buys in a cash transaction and short sells in a margin transaction the same number of shares. By cross trading stocks with shareholder perks, investors can receive eligibility for

[8] From Nikkei (2022): "*Shareholder benefit programs are a distinctive characteristics of the Japanese market, whereby many companies offer goods, services (sometimes including their own products), or discount coupons once or twice a year to shareholders who hold a certain number of shares or more*." Available at https://www.nikkei.co.jp/nikkeiinfo/en/global_services/quick/shareholder-benefits-still-boosting-stock-prices.html.

shareholder perks and hedge against potential price drops[9] on the ex-perk day.[10] In short, cross trades enable investors to receive shareholder perks while mitigating the downside price risk, leading to a surge in demands in both cash and securities lending markets. Meanwhile, the supply of lendable shares tends to contract, exacerbating the demand-supply imbalance. The more this imbalance intensifies, the likelier a PCR to incur, leading to a spike in PCRs as well as borrowing fees on the cum-day.

Finally, we examine whether deteriorated market quality in the securities lending market spills over to the stock market. The market microstructure literature motivates the selection of market quality measures, as well as the expected mechanisms through which deteriorated market quality in the securities lending market may transmit to the other market. As market quality/liquidity measures, we use stock turnover, bid-ask spreads, and Amihud (2002) illiquidity, and examine how these measures are affected on days when market quality in the securities lending market deteriorates significantly (i.e., cum-day and ex-day). We expect that stock turnover increases around these days, as suggested by our earlier finding that the new stock loan transactions increased significantly despite elevated borrowing costs, leading to more short selling volume in the stock market. This is in line with the literature, which documents that liquidity in the securities lending markets influences trading volume in the stock market. Conversely, we expect bid-ask spreads to widen, reflecting higher transaction costs and worsening market quality near ex-days.

[9] Huang et al. (2022) study stock price movements around ex-perk days and find that firms with shareholder perks experience a significant price decline on ex-perk days, indicating that non-cash gifts (goods and services) offered by shareholder perks programs are valued by investors. Nose et al. (2021) show high short sales volume and short interests before the ex-perk day, indicating active cross trades of stocks with shareholder perks.

[10] Investors who wish to receive (non-cash) goods and/or services as part of the shareholder perk program must buy the firm's shares prior to the ex-perk day to establish ownership. Generally, eligibilities for dividends and shareholder perks are established on the same day in Japan. Throughout the paper, we use "ex-dividend," "ex-perk," and "ex-" day(s) interchangeably.

This prediction is also supported by our earlier finding: The increase in new stock loan transactions despite elevated borrowing fees implies that short sellers were willing to pay these costs to initiate short sales. Generally, higher stock borrowing fees impose more constraints on short selling, which, as argued by Diamond and Verrechia (1987), drives out relatively *uninformed* investors and increase the proportion of *informed* investors. Anticipating that more informed traders initiate short sales, market makers respond by quoting wider bid-ask spreads, known as the adverse selection component of bid-ask spread. Consistent with our predictions, we find significant increases in both stock turnover and bid-ask spreads around ex-days. The former supports the notion that liquidity in the securities lending market influences stock trading activity, while the latter indicates that market makers' adverse selection costs rise during the same period. Meanwhile, we find no significant effect on Amihud (2002) illiquidity measure.

The contribution of this paper is threefold. First, in contrast to many earlier studies that focus solely on the effect of conventional stock borrowing fees in the securities lending market, we explicitly account for the fact that, in the Japanese market, the addition of Japan-specific SMT and PCR leads to a temporary but substantial surge in the overall costs borne by all short sellers. Second, we provide empirical evidence that this effect is even more pronounced around ex-dividend days, which have been the subject of conventional discussions. Finally, by examining how this PCR – the hidden cost – influences the behavior of short sellers and, in turn, affects the cash market via the securities lending market, our study offers a fresh perspective for future debates on the Japanese market.

The remainder of the paper is organized as follows. Section 2 provides detailed institutional backgrounds on margin transaction systems in Japan and introduces relevant literature. Section 3 describes the data. Section 4 presents our main empirical results. Section 5 provides conclusion.

2. Institutional background and related literature

2.1. Institutional background

In this subsection, we formally introduce the definition and determinants of the premium charge rate (PCR, or *Gyaku-hibu*), which would arise during the process of short sales using standardized margin transactions. In Japan, there are two types of short selling methods; the first is done through securities lending transactions while the second is done through margin transactions. The former (the latter) is mainly used by institutional (retail) investors. Figure 2 depicts main market participants in both stock lending and cash markets in Japan. Within the realms of margin transactions, there are general negotiable margin transactions (NMTs) and standardized margin transactions (SMTs) that use Japan Securities Finance (JSF) – while the former two, securities lending transactions and NMTs, are observed in foreign markets, SMTs are only practiced in Japan[11].

The inception of this unique, Japan-specific SMT system (via which short sales are executed) dates to the early 1950's. In the aftermath of the World War II, Japan's stock market was closed, and the re-opening of the exchanges was not permitted by the General Headquarters (GHQ) for approximately four years.[12] Even after trading resumed in May 1949, initial activity was limited exclusively to cash transactions; speculative activities such as futures trading, margin trading, and clearing transactions were not allowed, which severely deteriorated market liquidity. In 1951, while the introduction of margin trading modeled after the U.S. system was considered, the GHQ continued to prohibit futures trading and related activities. Moreover, domestic investors

[11] Estimated market sizes : securities lending transactions 6.7 trillion yen (59%) followed by NMTs 1.98 trillion yen (17%) and SMTs 2.74 trillion yen (24%). Lending data based on Markit as of 2020; margin trading balances as of June 27, 2025, from TSE.

[12] See Kasahara (2017) for a brief overview of the history of JSF and its development.

at that time lacked sufficient collateral for conventional margin trading. As a desperate measure, Japan devised its own means of margin trading – SMT – and established JSF as the supporting institution. Under this system, for selected securities, the JSF procured both cash and shares required for trading as a lump sum, imposing a maximum repayment period of six months, thereby providing financing and securities lending services to investors. During the interval preceding the offsetting trade, a lending-borrowing relationship is formed between the investor and the JSF. In essence, this specialized securities lending mechanism via JSF was originally designed as a method to segregate cash transactions from securities lending operations. This framework has persisted to date and continues to show its presence in the market. For instance, the PCR examined in this paper, together with the JSF's coordinated restrictions on borrowing and lending applications with the Tokyo Stock Exchange (TSE) and the suspension measures on margin trading (i.e., the prohibition of short selling), constitute regulatory measures peculiar to Japan. Yet, the impact of these Japan-specific institutional arrangements on short selling costs has received relatively little scholarly attention.

We next describe the circumstance under which PCRs would occur. As previously noted, PCRs are the costs that arise during the auction process by JSF to procure lendable shares from participating institutional lenders. PCRs likely occur when the supply of lendable shares of particular stock becomes contracted (while the demand remains high), causing the supply-demand imbalance. Upon observing such shortage, JSF conducts an open auction on the following business day's morning to procure the shares from participating institutional lenders with excess shares available for lent.

This section provides a detailed explanation of the mechanism through which the PCR occurs.[13] Figure 3 illustrates the JSF auction flow. Starting from the left side of the diagram, when retail investors engage in margin trading, they borrow funds or securities from their brokerage firms (*Participant A* and *Participant B*, respectively). Every evening, once buy/sell orders from the retail investors have been submitted, the brokerage firms internally match the buy and sell balance arising from their clients' SMT transactions. This internal matching refers to the netting of long and short positions within the firm. If there remains an imbalance after this internal netting—meaning additional securities are still needed— then the participants turn to *the JSF's Loan for Margin Transactions* to borrow the required amounts. In the depicted scenario, participant A ends the day with a net long SMT position of 1,000 shares, while participant B has a net short SMT position of 5,000 shares. These imbalances are submitted to JSF. After aggregating the imbalances across all participants, JSF records a net excess of stock loans—referred to as *Stock Loan Outstanding*—relative to fund loans—*Fund Loan Outstanding*—by 4,000 shares. This surplus condition is termed *Stock Over-lent*. The excess shares are scheduled to be procured in the JSF auction held on the following business day.

Moving to the right side of the figure 3, the diagram illustrates the proceedings on the day after the transaction. At the JSF auction, institutional investors and other participants submit bids to supply the necessary securities. The bidding process unfolds in multiple stages. For securities experiencing tight supply and high demand, the auction rate tend to increase through competitive bidding.

[13] For more details, refer to the "*JSF Auction, Gyaku-hibu, Maximum Bidding Rate, Bid to Cover Ratio*" section at https://www.taisyaku.jp/english/about/backwardation/

As a result of the bidding process, JSF determines and announces the cost incurred to borrow the deficient shares in the form of PCRs. Notably, the PCR materializes on a trade-date basis one day after the cash transaction and cannot be anticipated in advance (Figure 3 exhibits the exact timelines). Consequently, one must beware of elevated PCRs on some specific days – such as ex-dividend days – given the prevalence of cross-trading among retail investors that aim sorely at receiving shareholder perks while mitigating the risk of price drops on ex-days in the Japanese market (see Figure 4). According to the TSE, approximately 70% of retail trading activity involves margin transactions. As noted by Nose et al. (2021), shareholder perks cross-trading is a strategy often used by retail investors to purchase shares in the cash market while simultaneously shorting the same security. This dual transaction effectively offsets price fluctuations, allowing them to capture only the shareholder perks (i.e., in-kind dividends) without bearing market risk (more details on the shareholder perks cross-trading is summarized in the subsection 2.2.3). However, when a large number of investors employ this strategy concurrently, the resultant surge in short selling tightens the supply–demand balance in the securities lending market, triggering the frequent occurrence of PCRs. Consequently, short sellers eventually incur substantial borrowing costs.

An illustrative example is the case of KOIKE-YA Inc.[14] (ticker code – 2226), a publicly traded Japanese snack food manufacturer that produces and sells snacks and health foods. In December 2018 (at its fiscal year end), the company offered 2,500 yen worth of assorted bags of potato chips as shareholder perks – shareholders holding the threshold number of shares, typically the minimum of 100 shares, qualify for the perks. However, on the ex-dividend date (the final trading day to purchase shares to be eligible for rights), a PCR of 83.2 yen per share was incurred. In addition, an extra cost corresponding to seven holiday days over the year-end and New Year

[14] https://koike-ya.com/en/index.html

period was added, effectively imposing a burden equivalent to approximately 60,000 yen worth of potato chips on those engaging in shareholder perks cross-trading. Furthermore, PCRs also influence the fees within the securities lending market. As Miura (2025) notes, lenders typically annualize the PCR and add it as an extra charge to the standard borrowing fee. Thus, when the occurrence of high PCR is likelier, particularly on ex-dividend days, the overall borrowing fees temporarily spike, resulting in higher short selling costs.

2.2. Related literature

2.2.1. Short selling restrictions

Generally, short sellers are considered informative, and their trades contribute to liquidity and price discovery of stocks by driving down the prices of overpriced securities.[15] The extent to which they can contribute to liquidity and price discovery, however, depends on their ability to borrow the stock. Diamond and Verrecchia (1987) discuss two specific types of short-selling constraints and their respective impact on the pricing of stocks. The first is the short-prohibition effect, where short sellers are prohibited from shorting stocks because of, for example, the implementation of new regulations[16] that ban short selling. There is a strand of literature that studies the effect of short-selling bans that enacted in many countries. Boehmer et al. (2013) study the SEC's short-selling ban during the 2008-2009 financial crisis. Using intraday trades and quotes data, they construct various bid-ask spread measures to test market quality of banned stocks during the ban period. The results indicate that banned stocks experienced significant deterioration in market quality (wider

[15] SEC (1999): "*Short selling provides the market with two important benefits: market liquidity and pricing efficiency*." Available at https://www.sec.gov/rules-regulations/1999/10/short-sales

[16] Edwards et al. (2024) survey the literature on short-selling regulations which enacted around the world from 1896 to 2021.

bid-ask spreads and larger price impacts) during the ban period. Moreover, they also show that the prices of stocks subject to the ban were overpriced (compared to those of non-banned stocks) during the 13-day ban period, adding supports to Miller's (1977) overvaluation hypothesis. For international data, Beber and Pagano (2013) study short-selling bans that were implemented around the world in 2008 – 2009, and also confirmed that the bans led to impeded price discovery and wider bid-ask spreads of stocks subject to the bans.

The second, more related to our study, is the short-restriction effect, which occurs as a result of, for example, the imposition of up-tick rules (or price tests), the prohibition on naked shorting, and additional borrowing costs. Under these circumstances, short sellers are still able to execute short sales as long as they incur additional costs to do so. Diamond and Verrecchia (1987) document that the short-restriction effect drives relatively uninformed investors out of the market, and only those willing to incur higher costs (who are likely informed investors) execute short sales. Thus, short-selling restrictions increase the proportion of informed investors relative to uninformed investors. The main implication from the prior literature on the effect of short-selling constraints is that, whether *prohibited* or *restricted*, short-selling constraints widen bid-ask spreads and harms market quality of the affected stocks. Under the *prohibition,* information from short sellers is prevented from being incorporated into stock prices, causing pricing inefficiency and then harming market quality. Under the *restriction,* short sellers (only those informed) may execute short sales, and market makers know that trades are likely placed by the informed. The mechanism through which short-selling constraints adversely affect marker quality (bid-ask spreads) is well discussed in the market microstructure literature (for example, Glosten and Milgrom, 1985; Easley and O'Hara, 1987): The presence of informed traders increases the adverse selection cost of market makers, as they are induced to post wider bid-ask spreads to protect against the loss they would

incur from trading with the informed. This leads to higher trading costs, lower liquidity, and hence worsened market quality in the stock market.

2.2.2. Stock lending market

As noted above, short selling in Japan is executed via two primary channels: securities lending transactions – predominantly utilized by institutional investors – and two forms of margin transactions – NMTs and SMTs – that are mainly employed by retail investors. Prior research on Japan's securities lending transactions/market as well as their linkage with the stock market is relatively underexplored. For instance, Uno et al. (2009) study the linkage between the securities lending and cash markets by examining the effect of Japan's the tightening of short-selling regulations in 2008. They compare securities lending transaction data before and after the enactment of the new regulations, and examine how these regulatory changes influenced the trading behavior of participants in the securities lending market. As a result, the regulatory changes weakened the liquidity interdependence between the securities lending and cash markets, and potentially exacerbated the liquidity deterioration in the latter. Another strand of literature examines the linkage between the securities lending market and cash market in Japan through the lens of the Bank of Japan's (BOJ) ETF purchase program: Maeda et al. (2022) pointed out that asset management companies are permitted to lend out the stocks constituting ETFs held by the BOJ, and they report that the expansion of the BOJ's ETF purchasing policy has not only spurred significant growth in the securities lending market but has also diluted the overall effectiveness of the policy. In a related vein, Miura (2025) investigates the impact of the BOJ's ETF purchasing policy through the lens of actual securities lending operations – focusing on the objectives of stock borrowing, the equilibrium issues within the securities lending market, and the distinct characteristics of transactions arising from variations in lending fee levels. She explicitly considers

that the increase in ETF purchases by the BOJ enhances not only demand in the cash market but also supply, by facilitating short selling through an expansion of securities lending, and she separately analyzes the respective impacts of these effects on stock prices. Empirical evidence further confirms that ETF purchases contribute to an increase in short selling (a supply-side effect) that exerts a suppressing influence on stock price appreciation.

On the other hand, the existing literature on the effect of Japan's SMTs provides another set of insights. Isaka (2007), using PCR data from SMTs to measure short-selling constraints, stratifies stocks listed on the TSE between July 1998 and December 2001 into those with and without short-selling constraints to test the speed of stock price adjustments in the presence of negative information preceding firms' earnings forecast revisions. Consistent with Diamond and Verrecchia's (1987) prediction, he shows that the cumulative abnormal returns (CAR) of stocks with high short selling costs (the more constraint group) were found to be relatively insensitive to negative information prior to the announcements, but once the negative information was disclosed to the public, their CARs were significantly lower compared to those of stocks with lower short selling costs.

There is a more extensive strand of literature that studies the securities lending markets outside of Japan. Duffie et al. (2002) examine the operational practices of U.S. securities lending brokers, highlighting how brokers search for stockholders and negotiate lending fee terms upon the emergence of borrowing needs, and they develop an asset pricing model for short-selling execution. They note that, in instances where a lender cannot be located, lending fees initially surge but are expected to decline over time. D'Avolio (2002) analyzes 18 months of data from major U.S. financial institutions to elucidate the dynamics of securities lending transactions. By examining fluctuations in inventory levels, lending fees, and the incidence of recalls (i.e., the

retrieval of lent securities), he finds that lending fees tend to increase as the valuation gap between lenders and short sellers widens. Kolasinski et al. (2013) investigate the impact of demand shocks on lending fees: They find that for stocks with moderate demand, lending fees remain largely unaffected; however, for stocks with low inventory, increased supply shortages and high search frictions in borrowing lead to significant rises in lending fees, thereby elevating short selling costs. Beneish et al. (2015) further examine the economic determinants of short selling supply and its impact on future stock returns, asserting that the volume of securities available for lending plays a central role in both price formation and return predictability. Moreover, Blocher et al. (2013) focus on changes in lending fee levels and inventory supply by discussing the equilibrium between the cash market and the securities lending market in the United States. They classify stocks into hard-to-borrow (SC) and easy-to-borrow (GC) categories and, by examining ex-dividend days as events that shift the supply curve in the securities lending market, report that SC stocks react more strongly to the exogenous shock of reduced lending inventory—evidenced by a sharp increase in their lending fees on ex-dividend dates.

Thornock (2013) and Dixon et al. (2021) study securities lending activities around ex-dividend days and test market quality of the security lending market and stock market in the US, respectively. Thornock (2013) projects that, as tax-sensitive lenders are incentivized to recall their shares on loan before the ex-day to avoid higher taxes on substitute dividends, there is a sharp decline in the supply of lendable shares around ex-days, causing higher likelihood of extreme borrowing fees, that of fails to deliver, increased loan search frictions, and equity mispricing, each of which is used as a measure of market quality in the securities lending market. Analyzing a daily panel of short transactions for stocks listed on the NYSE, Nasdaq, and AMEX exchanges from 2005 to 2007, he empirically shows that the security lending market quality deteriorates

significantly around ex-days. Dixon et al. (2021) show that borrowing fees increased significantly around ex-days. Using bid-ask spreads and price impacts as market quality measures in the stock market, they also show that the stock market experiences a deterioration in market quality around ex-days, suggesting the interdependence between the securities lending and cash markets.

As the SMT system, utilizing the Japan Securities Finance (JSF), is virtually nonexistent in foreign markets, there is a paucity of comparable international research on this mechanism. Consequently, our analysis leverages additional short-selling costs that are unique to Japan, such as PCRs, to provide a deeper examination that extends the insights established by previous studies.

2.2.3. Shareholder perks and cross trades

Firms offer shareholder perks to their shareholders who hold the minimum number of shares necessary to qualify for the perks. Although shareholder perks are not uncommon in many countries, the empirical research that studies the effect of shareholder perks on firm value usually analyzes Japanese data. The data that summarize each firm's shareholder perk, the type of perk, the minimum number of shares necessary to qualify for the perk, etc., are relatively easy and inexpensive to obtain for investors and researchers, either on their brokers' websites or from a subscription-based company handbook that is published quarterly, *Kaisha Shiki Hou.*[17] Karpoff et al. (2021) study firms that initiate shareholder perks programs and show that the initiation leads to positive announcement stock returns in the short-run and higher market value of equity in the long-run. Since shareholder perks can be considered as a non-cash distribution in the form of gift cards, assortments of gifts, or discount coupons by the firm, it can be expected that the cash-equivalent amount of such gift would be deducted from the firm's stock price on the ex-perk day: Huang et

[17] https://shikiho.toyokeizai.net/

al. (2022) find a significant price drop for the stock prices of firms with shareholder perks on the ex-perk day, suggesting that non-cash distributions offered as part of the perks programs are valued by investors. Nose et al. (2021), focusing on cross trades around ex-perk days, show a significant increase in both trading volume and short interest for stocks with shareholder perks. These results are suggestive of active cross trades – many investors attempt to buy and short the same number of shares to qualify for the stock's shareholder perks and hedge against price drops on the ex-day, respectively.

3. Data

The sample analyzed in this study comprises all stocks listed on the First Section of the Tokyo Stock Exchange (TSE) from April 2010 through the end of March 2021. Data on stock-level characteristics, including stock prices and dividends, are obtained from Astra Manager by Nikkei QUICK. Data on securities lending transactions are obtained from S&P Global (formerly IHS Markit)[18]. Data on margin trading are acquired from Japan Securities Finance (JSF). Data on bid and ask prices are downloaded from Datastream. As of November 21, 2011, the TSE altered the closing time of its morning session; our analysis does not account for any changes in trading session length. From July 16, 2019 onwards, the TSE has adopted the T+2 settlement period (previously it was the T+3 settlement period). Since the majority of the observations used in our analysis is from the pre-July 16, 2019 period, for brevity we adopt the T+3 settlement period throughout the analysis. In addition, for the purposes of this analysis, we have created a dataset

[18] S&P Global (formerly IHS Markit) collects daily self-reported data from more than 100 trading participants in the stock lending market. Dixon et al. (2021) use data from Financial Information Service (FIS) Astec Analytics (formerly SunGard). Duong et al. (2017) compare both FIS and Markit datasets and note that there is essentially no material difference between them. See p. 2359, footnote 5: "*In unreported results, we find significant correlation for the key variables across the two datasets (Markit and SunGard): 80% for the shorting demand and about 86% for the lending fees.*"

that matches the settlement timing of the stock lending market with that of the cash market. All variables are defined in the Appendix.

4. Empirical results

In this chapter, we present our empirical findings and relevant discussions. Our baseline analysis examines a sample of publicly traded firms that paid dividend from April 2010 through March 2021. By incorporating a battery of securities lending variables (from Markit) as well as Japan-specific borrowing fee, the PCR, we investigate how trading activities in the securities lending markets affect those in the cash market. As discussed earlier, PCRs are inherently unpredictable for short sellers at the time of the trade; they are determined based on the demand-supply conditions of stocks during the JSF auction on the following business day and subsequently charged as an additional borrowing fee, increasing overall short selling costs. We empirically assess the impact of these uncertain and unexpected borrowing costs on stock market liquidity and quality. The key empirical results are presented in the following subsections.

4.1. Lending market analysis

4.1.1. Borrowing costs around ex-dividend days

First, we focus on the trading activities in the securities lending market around dividend record days. The previous literature documents that both short selling volume and borrowing fees tend to increase significantly around this period (Thornock, 2013; Dixon et al., 2021), possibly due to a sudden decline in the supply of lendable shares (supply contraction) and/or an increase in the demand for them (demand expansion). We analyze our sample of Japanese stocks to examine whether a similar pattern exists in the Japanese market.

We follow Dixon et al. (2021) to estimate the following regression model:

$$SBL_{it} = \alpha + \sum_{\Delta=-5}^{5} \beta^{T+\Delta} D_{it}^{T+\Delta} + event\ FE + \varepsilon_{it}, \quad (1)$$

where the dependent variable, SBL_{it}, is the securities borrowing lending (SBL) variable, which is measured by the following variables: *Fee, Fee Range, UtilRate, SharesOnLoan, NewTransactions, LoanAge*, and *SharesAvailable. D_{it}* is an event day dummy which takes a value of 1 for event day T-5 through T+5, where T is the ex-dividend day, and zero otherwise. The model includes both firm- and dividend- fixed effects (denoted as α and *event FE*, respectively). We include daily observations that are within 30 days before and after the ex-day, [-30, +30]. *i* and *t* denote firm *i* and day *t*, respectively. Definitions of the variables are provided in the Appendix.

Table 1 reports summary statistics of the SBL variables as well as firm/stock-level characteristics, and Table 2 reports correlations between the variables used in our baseline analysis. Among various types of the SBL variables, we are particularly intrigued with *Fee* and *NewTransactions*, which can directly measure a stock's borrowing cost and the number of new transactions initiated on each observation day, respectively. The mean value of *Fee,* which is the Japanese Yen-weighted average indicative lending fee charged across all loans outstanding on a given stock-day, is 207 basis points (annualized). This is much higher than the mean value *Fee* variable reported in Dixon et al. (2021) as 65 basis points, indicating that Japanese stocks on average tend to have higher borrowing fees than US stocks. We attribute generally higher borrowing fees reported for Japanese stocks to the presence of Japan-specific borrowing costs, the PCRs, as noted by Miura (2025) that securities lenders typically add annualized PCRs as extra

charge to the standard borrowing fee. The mean (median) value of another key SBL variable, *NewTransactions*, is 71 (42) transactions per stock-day. This variable plays an important role in our baseline analysis, such that a higher value of *NewTransactions* indicates higher demand for borrowing particular stocks around ex-dividend days. As documented in the literature, borrowing fees tend to spike around ex-dividend days; if we observe an increase in the number of *NewTransactions* around the same period, it would indicate the presence of short sellers who (are willing to pay elevated borrowing costs to) execute short sales, which we predict would make a significant impact on the stock market liquidity and quality, as discussed in the subsection 4.2. For the correlation among SBL and firm/stock-level characteristics, we observe qualitatively similar results to those reported in Dixon et al. (2021) in terms of signs.

Table 3 reports the results from panel regressions, as estimated in Eq. 1. While Dixon et al. (2021) focuses on securities lending activities on the dividend record day (*RecDay*), i.e., the last trading day of the month, we designate our focus on the ex-dividend day (*ExDay*), in an attempt to capture the unique effect of PCRs in Japan. Overall, our results are generally consistent with those reported in Dixon et al. (2021) that on particular days around dividend events, *CumDay* through *RecDay2* (two days after *RecDay*), the following SBL variables increased significantly: *Fee, UtilRate, SharesOnLoan,* and *NewTransactions;* decreased significantly: *LoanAge* and *SharesAvailable*; and *FeeRange* showed mixed results. For brevity, we first discuss the results from models 1 and 5 (which respectively uses *Fee* and *NewTransactions* as the dependent variable), as these variables have important implication for the analysis presented in the following subsections 4.1.2. and 4.2. Both positive and significant coefficients on *CumDay* and *ExDay* indicate that, consistent with the literature that draws its conclusions based on the US stock samples, Japanese stocks tend to experience elevated borrowing fees around dividend events, particularly on the cum-

and ex-dividend days. However, based on the result from model 1, whether the sudden increase in borrowing fees around the ex-day is driven by the supply contraction, demand expansion, and/or both, is not clear. Thus, it is of interest now to look at the result from model 5, where the number of new stock borrowing transactions (*NewTransactions*) is used as the dependent variable, to examine trading activities in the securities lending market around this period. Similar to the results from model 1, we show that the number of new stock borrowing transactions increased significantly from *CumDay* through *RecDay2,* compared to other trading days in our sample. These results suggest that, despite the necessity to pay for elevated borrowing fees, the demand for stock borrowing remained significantly high around the ex-dividend day, adding supports to the demand expansion explanation documented by Dixon et al. (2021).

Next, we turn to the results from other models – Models 2, 3, 4, 6, and 7, where the dependent variables are *FeeRange, UtilRate, SharesOnLoan, LoanAge,* and *SharesAvailable,* respectively. *FeeRange*, as defined as the difference between the maximum and minimum lending fee (set by different lenders) on stock *i*, increased significantly on the ex-day and on the day before the record day (Model 2). Increased values for *FeeRange* indicate that lenders can set different fee rates more aggressively on the same stock, which is contrary to the "law of one price" and makes the securities lending market "opaque.[19]" *Loan Age,* defined as the (weighted) average number of days from the start date to present (day *t*) for all transactions for stock *i*, decreased significantly on days around the ex-dividend day (Model 6). This indicates that more lending transactions made around the ex-dividend days are short-terms, suggesting that the borrowed shares are used to short covering of stocks with shareholder perks. *UtilRate* and *SharesOnLoan,* which also serve as proxy

[19] Thornock (2013, p.1837): "[…] *The excess lending fees documented in this study are a consequence of the opacity in the market and are contrary to the law of one price*"

for the demand for lendable shares (Models 3 and 4), increased significantly more around the ex-dividend day, adding supports to the earlier discussion that the demand for lendable shares remained high despite the elevated fees. Finally, *SharesAvailable* (the yen value of shares available for lending divided by the stock's market cap) decreased significantly around the ex-dividend days (Model 7), suggesting that the supply contraction escalated with fewer shares were available for loans.

4.1.2. Market quality in the securities lending market and PCRs

Our next focus is on the market quality of the securities lending market around ex-dividend days as well as PCRs. Thornock (2013) measures the market quality in the securities lending market in the form of loan price inefficiency, stock mispricing, search frictions, and microstructure frictions. We basically follow and modify his empirical model to test the market quality of securities lending market around ex-days, estimated as:

$$\Pr(Fee > 100\ bp)_{it} = \alpha + \beta_1 EVENT[-1,0]_{it} + \beta_2 CumDay_{it} + \beta_3 ExDay_{it} + \beta Controls + \varepsilon, \quad (2)$$

where the dependent variable, *Pr (Fee > 100 bp)*, measures the loan price inefficiency in the securities lending market, defined as a binary variable that is set equal to one if, for stock *i* on day *t*, its loan fee increases by more than 100 basis points from the previous trading day *t-1*, and zero otherwise. Thornock (2013) argues that the higher the likelihood of extreme loan fees, or "spikes," the more loan price inefficiency, which in turn deteriorates the securities lending market quality. $EVENT[-1, 0]_{it}$ is a dummy variable that is set equal to 1 for observations made on either cum- or ex-dividend day, and zero otherwise. Following Thornock (2013), we exclude observations made

on day $t = [-15, -5] \cup [5, 15]$, where t=0 corresponds to the ex-day.[20] We also include dummy variables, $CumDay_{it}$ *and* $ExDay_{it}$, to look at the effect of each key day on the market quality. Moreover, we include firm/stock-level control variables: dividend yield (*DivYield*), the natural log of market capitalization (*Ln(MV)*), market-to-book ratio (*M/B*), stock turnover (*Turnover*), institutional ownership (*IO*), and an indicator for stocks that are the constituents of the Nikkei225 Index (*Nikkei225*) – these control variables are considered in the previous literature as those influencing the level of stock borrowing fees. We run the models estimated in Eq. 2 using both linear probability models (LPM) as well as logit regressions.

Table 4 reports the results from regressions, as estimated in Eq. 2. Both in LPM and in logit models (with random effects and fixed effects), we show that the probability of a borrowing fee spike is significantly higher on the cum- and ex-dividend days, compared to other trading days in our sample. When we substitute *Pr (Fee > 250 bps)* for *Pr (Fee > 100 bps)* and re-run the regressions in Panel B, we obtain somewhat slightly weaker results for LPMs and much stronger results for logit models, suggesting that our results are robust to the assignment of different threshold value for the *Pr (Fee > X)* variable. In summary, our results are consistent with Thornock (2013) that market quality in the securities lending market significantly deteriorates around dividend event days, particularly on the cum- and ex-dividend days.

Now we turn our focus to the PCR, another non-negligible borrowing cost that seems to occur frequently around ex-dividend days. To examine how PCRs fluctuate around ex-days, we estimate both linear probability and logit models as:

[20] In Thornock (2013), t=0 corresponds to the dividend record-day. Since throughout our analysis the main focus is on the effect of PCRs on market quality in both securities lending and stock markets, we let t=0 correspond to the ex-dividend day, considering the fact that PCRs tend to occur most frequently on the cum- and ex-dividend days, after which its occurrence becomes less frequently, as our later analysis in Table 5 indicates.

$$\Pr(PCR > 0)_{it} = \alpha + \beta_1 EVENT[-1,0]_{it} + \beta_2 CumDay_{it} + \beta_3 ExDay_{it} + \beta Controls + \varepsilon, \quad (3)$$

where *Pr (PCR>0)* is set equal to 1 for stock i on day t to have a non-zero PCR, and zero otherwise. The right-hand side variables remain the same as those in Eq. 2. Table 5 reports the results. As expected, the occurrence of PCRs is significantly more frequent on both cum- and ex-dividend days, compared to other trading days in the sample. The results are robust to the inclusion of firm/stock level characteristics, suggesting that, regardless of the firm's size, market-to-book ratio, liquidity, ownership structure, and inclusion in the Nikkei225 index, Japanese stocks tend to experience significantly high borrowing costs around ex-days.

The effect of several control variables (*DivYield, Ln(MV)$_{t-1}$, IO*) on the probability of PCR is worth discussing. As offering shareholder perks are often considered as a substitute for paying out dividends, we expect that firms paying lower dividends (lower *DivYield*) tend to offer shareholder perks and hence have higher likelihood to experience spikes in PCRs around ex-dividend days. Consistent with this view, we show that *DivYield* is negatively associated with the occurrence of PCRs. Next, the demand-supply imbalance of lendable shares tends to be most pronounced among small cap stocks, as the search for lendable shares of large cap stocks seems to be relatively easier. Contrary to this intuition, we show that the market cap (*Ln(MV)$_{t-1}$*) is associated with higher probabilities of PCRs. Finally, institutional ownership percentage (*IO*) is negatively associated with the probability of PCRs. This is consistent with our expectation that firms with lower institutional ownership are owned more by retail investors, who tend to use SMTs to execute short sales and engage in shareholder perks cross-trades. As more retail investors engage in cross-

trades of stocks offering shareholder perks, PCRs of such stocks tend to spike around ex-dividend days.

4.2. Stock market analysis

Finally, we examine how the deterioration in market quality of securities lending market spills over to the stock market around ex-dividend days. Using daily data on stock price data, including bid and ask prices, as well as trading volume, we construct the following variables to measure and test market quality/liquidity in the stock market around ex-days: Bid-ask spreads (*PQS* and *QS*), stock turnover (*Turnover*), and Amihud's (2002) illiquidity measure (*ILLIQ*), as all defined in the Appendix. Moreover, we add the premium charge rate (*PCR*) as the fifth dependent variable. The former four variables the market quality measures for the stock market, while *PCR* is that for the securities lending market. Empirically, we follow Dixon et al. (2021) to estimate the following regression:

$$MQ_{it} = \alpha + \sum_{\Delta=-5}^{5} \beta^{T+\Delta} D_{it}^{T+\Delta} + event\ FE + \varepsilon_{it}, \quad (4)$$

where the dependent variable, MQ_{it}, is measured by *PQS, QS, Turnover, ILLIQ,* and *PCR,* as described above; the other right-hand side variables remain the same as those in Eq. 1. We stratify the sample stocks into those with high (low) market capitalization groups. Table 6 presents the results. For bid-ask measures (*PQS* and *QS*), we generally observe a consistent pattern that bid-ask spreads widen significantly more around dividend event days, from *CumDay* through *RecDay2,* compared to other trading days. As motivated in the sections 1 and 2, wider bid-ask spreads are potentially reflective of market makers' attempt to quote wider spreads as the protection for trading against informed traders. In the subsection 4.1.1, we show that, despite elevated borrowing fees, the number of new lending transactions increased significantly around ex-days. As Diamond and

Verrecchia (1987) predict, short-selling constraints increase the proportion of informed traders relative to the uninformed. In our context, stocks which are subject to elevated borrowing fees would be considered "short-selling constrained" – thus, if the number of new lending transactions indeed increased for those stocks, despite high short-selling costs, more trade orders are likely come from informed investors. This induces the market makers to quote wider bid-ask spreads, which in turn increases trading costs and deteriorates market quality. We generally find either mixed or insignificant results for stock turnover (*Turnover*) and Amihud's illiquidity measure (*ILLIQ*) – these results are likely because liquidity in the stock market (the numerator and denominator values for *Turnover* and *ILLIQ,* respectively) is partially aided by increased liquidity in the securities lending market around ex-days. Lastly but not least, we examine how *PCR*s fluctuate around ex-days. We show that PCRs increase significantly only on the cum-day, and they start decreasing sharply from *ExDay* through *RecDay1* (i.e., one day after the record day). This suggest the presence of retail investors who engage in shareholder perk cross-trades, which elevates the demand for stocks with shareholder perks, exacerbates the demand-supply imbalance of borrowable stocks on the cum-day, and consequently causes higher PCRs and shorting costs. Generally, similar patterns are observed regardless of whether firms are stratified into those with high or low market capitalization groups.

5. Conclusion

Short sellers trade on negative information and hence their trades drive down the prices of overvalued securities, which contributes to the price discovery process. Moreover, short selling accounts for a large portion of trading volume: Thornock (2013) reports about 20% of traded shares involve a short position in the US while the Tokyo Stock Exchange also reports the similar figure.

Thus, short selling contributes to more liquidity in the stock market. However, the extent to which short selling can contribute to price discovery and liquidity in the stock market depends on short sellers' (borrowers') ability to locate shares, and the search frictions (e.g., high borrowing cost) in the securities lending market make short selling more expensive and subsequently more constrained, which potentially inhibits the price discovery process and deteriorates liquidity. The literature has attempted to measure the degree of "short selling constraints" by using conventional borrowing fees (e.g., rebate rate in a stock lending transaction). These costs are usually known at the time of trades, or realized when trades are executed (t=0). The premium charge rate (PCR), an additional borrowing fee only observed in the Japanese market which we shed light on in this paper, is very unique in such a way that short sellers do *not* know if the stock they sell short today (t=0) will incur an additional borrowing cost (PCR) until the JSF auction concludes and the demand-supply imbalance for lendable stocks has been reconciled on the *following* business day (t=1). Furthermore, they do not know at t=0 how *high, low, or zero* will the PCR amount be. These two overlapping sources of uncertainty provides us with an interesting empirical setting to test their effect on market quality in both securities lending and cash markets.

In this paper, we study the link between the securities lending and cash markets in Japan, which allows us to shed light on an additional borrowing fee only observed in the Japanese market, the premium charge rate (PCR). Our findings are threefold. First, consistent with the previous literature that primarily analyzes US data, we find that Japanese stocks also experience significantly high borrowing costs around ex-dividend days. The reported average borrowing costs for Japanese stocks are seemingly much higher than those reported for US stocks in Dixon et al. (2021). This is because, in addition to the conventional borrowing fee, stock lenders in Japan typically add the annualized PCR rate when they *anticipate* the stock for lent would incur a PCR,

making short selling Japanese stocks more expensive. Second, we show that the occurrence of PCRs – additional borrowing costs only observed in the Japanese market – is significantly more frequent on cum- and ex-dividend days than other trading days, strengthening the notion that the sudden increase for particularly popular stocks (e.g., those with shareholder perks) likely causes the demand-supply imbalance of lendable shares around ex-days. This finding opens the door for future research to examine, for example, what type(s) of shareholder perk attract(s) retail investors to invest and also engage in cross trades. Third, we show empirical results that support the link between the securities lending and cash markets. We find that deteriorations in market quality in the former spills over to the latter around dividend ex-days.

We complement the findings of the previous literature by revealing the "hidden cost" of short selling, or PCRs in Japan. Our results suggest that, not only the conventional borrowing fees, which has been shown to deteriorate the price discovery and market quality in the previous literature, but also the unique, additional short selling cost has non-trivial adverse effects on both securities lending and cash markets. Therefore, academic researchers and market participants must beware of market- or country-specific frictions that may be often unnoticed but may lead to unfavorable consequences if they are overlooked, as we can recall from the "60,000-yen potato chips tragedy."

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Figure 1: Stock borrowing fees around ex-dividend days
This figure plots the average borrowing fee of our sample stocks around ex-dividend days. The *Annualized fee* is defined as the annual average borrowing fee; Day 0 is the ex-dividend day.

Figure 2: Participants in the Stock Lending market

This figure shows a diagram of the relationships between participants in the stock lending market. In addition to general negotiable margin transactions (NMTs), there is a second type of margin transaction in Japan, namely standardized margin transactions (SMTs), through which short sales are executed via Japan Securities Finance (JSF). There are three types of participants in the stock lending market: lenders, borrowers, and brokers. Lenders include life insurance companies, trust banks that have been entrusted with investment management by pension funds, investment management companies, overseas custodians, JSF, and etc., and they supply shares for loans. Borrowers include individual investors and corporate investors such as hedge funds, etc., and they demand loanable shares for short selling settlements. Brokers, who act as the middleperson, handle both supply and demand needs, such as procuring loaned shares for customers' short selling settlements and trading funds.

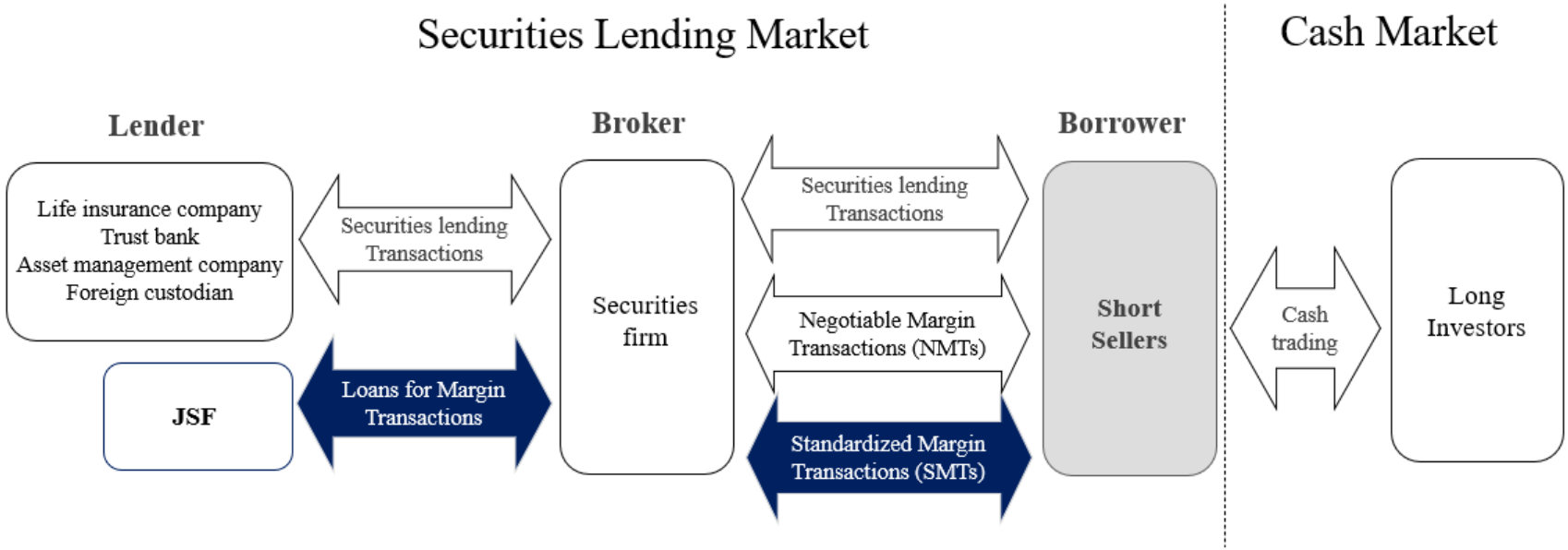
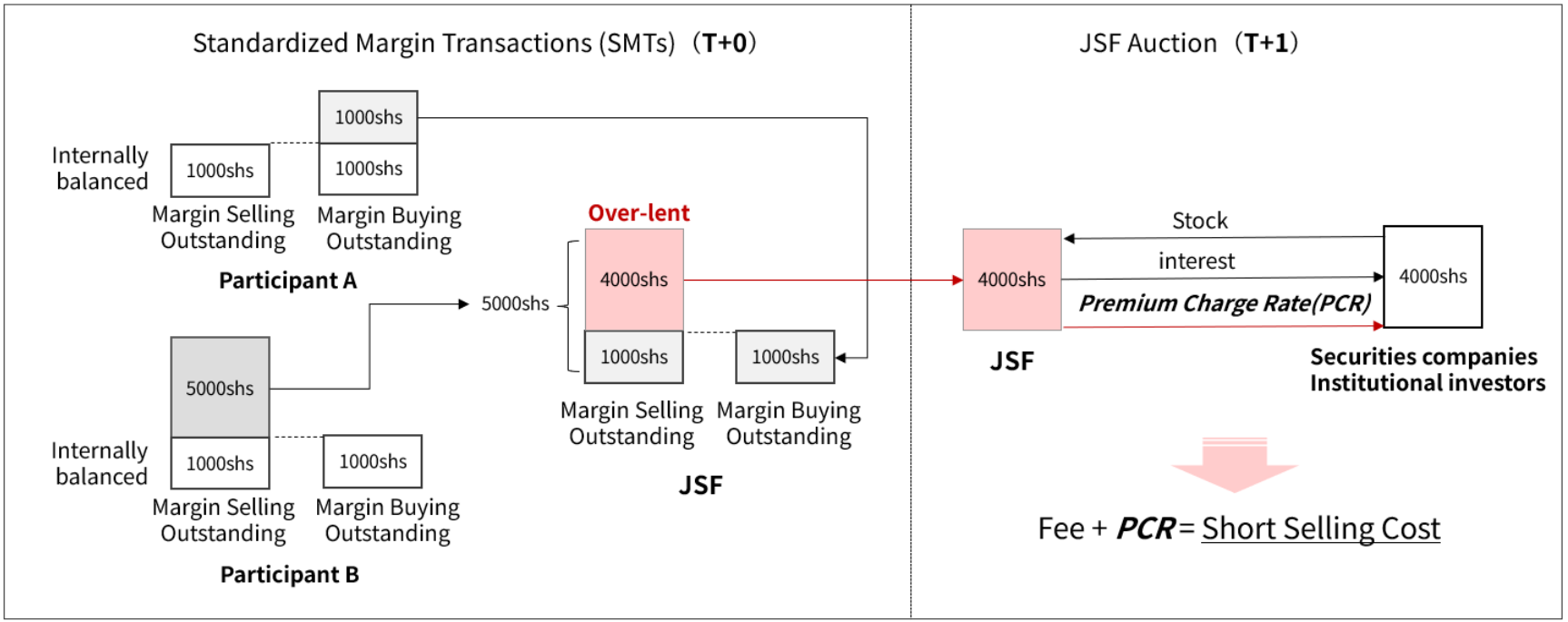


Figure 3: Method for Determining the Premium Charge Rate (PCR, or Gyaku-hibu)
This figure exhibits the flowchart of the process that determines the PCR. In JSF, an auction is held in the morning of the next business day for issues that have become "over-lent," where the balance of unsold SMTs exceeds the balance of unsold securities. As a result of the auction, JSF announces the PCR on a trading day (previous business day) basis. On the same day, the cost of short selling increases in the stock lending market because the cost of PCR is added to the normal fee.



[JSF Auction, Gyaku-hibu, Maximum Bidding Rate, Bid to Cover Ratio | Loans for Margin Transactions]
[品貸入札、逆日歩、最高料率、応札ランク | 日本証券金融株式会社 | 貸借取引情報]

Figure 4: Schedule around the Ex-Day

This figure shows the schedule before and after Ex-day. (In this analysis, the schedule is shown before the TSE shortened settlement period for stock certificates and other securities implemented in July 2019.) In order to receive the rights, dividends, and shareholder perks associated with a stock certificate, it is necessary to buy the certificate by the final trading day with rights (Cum day) and to hold the certificate on the record date (Record day).For transactions on the Cum day, the JSF Auction is conducted in the morning of Ex-day, and the PCR is determined around noon. The PCR announced by JSF is added to the Fee in the stock lending market, increasing the cost of short selling. If the business day following the JSF borrowing day falls on a weekend or holiday, the repayment date will be postponed, and the cost including the repayment date will be added for the number of days.

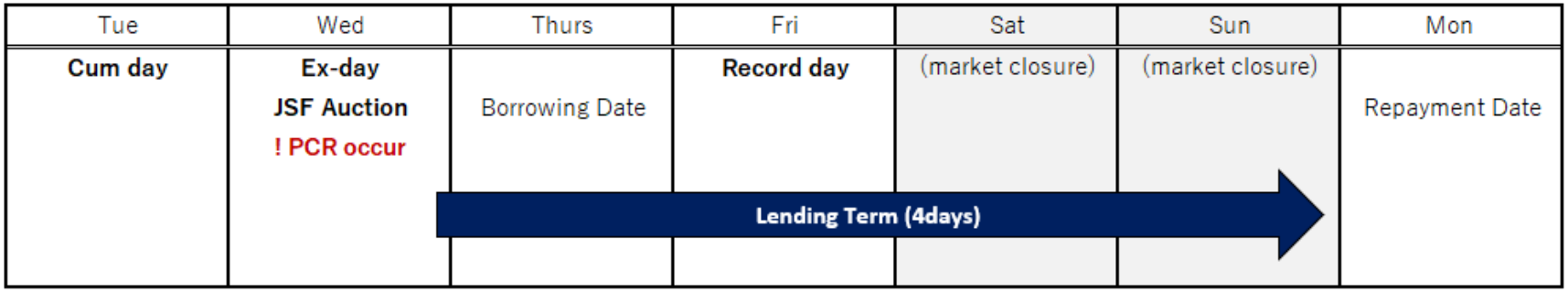


Table 1: Summary statistics

This table reports summary statistics of the variables used in our empirical analysis. Each variable's definition is provided in the Appendix. We follow Dixon et al. (2021) to compute average values of the variables over the period *t=(-30, -6)*, relative to the dividend ex-day, *t=0*.

			Time horizon: 2010–2021						
Variable	Mean	SD	P5	P10	P20	P50	P75	P90	P95
			Firm/dividend characteristics						
MV(Millions)	164,088	586,679	2,445	3,579	7,591	20,487	76,773	327,619	742,484
CumPrice	1,839.20	489.23	1,117.88	1,216.82	1,399.02	1,921.20	2,149.24	2,520.28	2,520.28
IO(%)	21.94	3.51	14.16	16.58	19.33	23.36	24.66	25.45	25.61
SI(%)	1.44	2.04	0.08	0.14	0.38	0.91	1.77	3.08	4.35
Div	91.84	646.05	0.00	2.70	8.80	20.00	41.00	77.50	120.00
DY(bps)	1.93	1.27	0.00	0.37	1.09	1.82	2.62	3.46	4.07
			Lending market conditions from Markit						
Fee(bp)	206.68	260.31	37.50	41.86	50.00	62.50	300.00	585.71	742.86
FeeRange(bp)	12.37	60.79	0.00	0.00	0.00	0.00	4.30	23.80	58.91
SharesOnLoan(%)	3.37	4.78	0.11	0.24	0.67	1.67	4.12	8.43	12.23
SharesAvaliable(%)	13.84	10.38	1.26	2.66	6.10	12.28	19.76	27.02	31.34
UtilRate	13.54	18.88	0.00	0.17	1.42	5.28	17.35	40.98	58.50
LoanAge(days)	155.81	139.68	32.63	44.31	69.99	115.95	195.43	300.74	398.29
NewTransactions	71.68	96.86	3.00	6.00	16.82	41.93	89.44	167.86	237.17
			Market quality measures						
ILLIQ	1.82	74.33	0.00	0.00	0.00	0.01	0.05	0.19	0.42
N(dividends)	18,872		N(firms)	3,942					

Table 2: Correlations

This table reports correlations among the variables used in our empirical analysis. Each variable's definition is provided in the Appendix. We follow Dixon et al. (2021) to compute average values of the variables over the period *t=(-30, -6)*, relative to the dividend ex-day, *t=0,* and then compute the correlations. The bottom left harf of the table shows Pearson's correlation coefficients and the upper right half shows Spearman's rank correlation coefficients. Values reported in parentheses indicate negative correlations.

	Div	*CumPrice*	*ln_MV*	*DY*	*IO*	*SI*	*ILLIQ*	*LoanAge*	*ln_Fee*	*New Trans.*	*UtilRate*	*Shares Avalable*	*Shares OnLoan*
Div	1.00	(0.06)	0.41	0.38	0.18	0.08	(0.22)	(0.16)	(0.42)	(0.01)	(0.26)	0.33	(0.12)
CumPrice	0.02	1.00	(0.12)	0.04	0.43	(0.04)	0.10	(0.02)	0.11	(0.05)	0.00	(0.06)	(0.05)
ln_MV	0.03	(0.07)	1.00	(0.02)	0.13	0.48	(0.87)	(0.26)	(0.58)	0.35	(0.31)	0.71	0.03
DY	0.07	0.00	0.00	1.00	0.26	(0.15)	0.11	0.05	(0.32)	(0.18)	(0.26)	0.05	(0.26)
IO	(0.00)	0.30	0.17	0.22	1.00	0.09	(0.06)	(0.06)	(0.32)	0.05	(0.17)	0.21	(0.09)
SI	(0.00)	(0.01)	0.18	(0.12)	(0.01)	1.00	(0.65)	(0.36)	(0.17)	0.51	0.19	0.55	0.48
ILLIQ	(0.01)	(0.00)	(0.25)	0.01	(0.07)	(0.12)	1.00	0.29	0.40	(0.45)	0.12	(0.70)	(0.22)
LoanAge	(0.03)	(0.04)	(0.21)	0.02	(0.05)	(0.20)	0.13	1.00	0.18	(0.24)	(0.13)	(0.27)	(0.29)
ln_Fee	(0.00)	0.11	(0.57)	(0.31)	(0.31)	0.05	0.18	0.16	1.00	(0.04)	0.47	(0.54)	0.20
NewTransactions	(0.00)	(0.01)	0.32	(0.11)	0.00	0.29	(0.12)	(0.15)	0.06	1.00	0.56	0.37	0.82
UtilRate	(0.01)	0.04	(0.28)	(0.25)	(0.23)	0.26	0.02	(0.09)	0.59	0.48	1.00	(0.27)	0.78
SharesAvalable	0.04	(0.00)	0.67	0.05	0.19	0.28	(0.21)	(0.24)	(0.46)	0.32	(0.21)	1.00	0.20
SharesOnLoan	0.00	0.04	(0.02)	(0.21)	(0.15)	0.43	(0.08)	(0.17)	0.34	0.69	0.74	0.23	1.00

Table 3: Lending activities around dividend events

This table reports the results from panel regressions. Definitions of the dependent variables are provided in the Appendix. *CumDay, ExDay, RecDay_1, RecDay, RecDay1,* and *RecDay2* are indicator variables that are set equal to 1 for observations made on dividend cum-days, ex-dividend days, one day before dividend record days, dividend record days, one day after the record days, and two days after the record days, respectively, and 0 otherwise. All models include firm- and dividend fixed effects. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively. t-stats are reported in parentheses.

Dependent variable:	*Fee(bp)*	*FeeRange (bp)*	*UtilRate (%)*	*Shares OnLoan(%)*	*New Trans. (N)*	*LoanAge (days)*	*Shares Avalable(%)*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CumDay	4.036***	0.0151	3.389***	0.671***	7.015***	-22.33***	-0.278***
	(7.18)	(0.06)	(36.52)	(33.02)	(17.94)	(-47.59)	(-16.03)
ExDay	4.511***	0.547*	3.642***	0.742***	7.378***	-25.24***	-0.207***
	(7.90)	(2.23)	(38.12)	(33.83)	(17.47)	(-52.25)	(-11.08)
RecDay_1	4.812***	1.355***	3.298***	0.731***	7.324***	-26.76***	-0.185***
	(8.11)	(3.75)	(38.11)	(33.50)	(16.82)	(-54.06)	(-10.06)
RecDay	7.534***	0.346	2.917***	0.617***	6.334***	-26.15***	-0.310***
	(13.27)	(0.67)	(36.40)	(29.03)	(15.12)	(-51.21)	(-16.79)
RecDay1	6.083***	-0.0513	2.051***	0.490***	4.572***	-21.84***	-0.0745**
	(9.29)	(-0.24)	(35.12)	(26.86)	(12.55)	(-47.08)	(-3.15)
RecDay2	6.999***	-0.135	1.473***	0.339***	2.842***	-18.53***	-0.0915***
	(4.43)	(-0.66)	(29.62)	(21.82)	(9.60)	(-42.10)	(-5.65)
_cons	210.6***	10.64***	12.97***	3.277***	71.87***	155.9***	13.88***
	(4096.09)	(618.76)	(1867.48)	(1760.45)	(1905.20)	(3515.96)	(8591.52)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dividend FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2,528,958	2,444,685	2,524,680	2,385,786	2,472,066	2,472,066	2,416,487
R-squared	0.695	0.068	0.408	0.459	0.472	0.222	0.565

Table 4: Probability of extreme lending fees around dividend events

This table reports the results from linear probability models (LPM), logit models with random effects (RE) and with fixed effects (FE). The dependent variable, PR(Fee > 100 bp or 250 bp) is a binary variable that equals 1 if, for stock *i* on day *t*, the borrowing fee increases by larger than 100 and 250 basis points (reported in Panels A and B, respectively) from previous trading day (day *t-1*), and 0 otherwise. EVENT[-1, 0] is an indicator variable that is set equal to 1 for observations made on cum-dividend days or ex-dividend days, and zero otherwise. *CumDay* and *ExDay* are indicator variables that are set equal to 1 for observatitons made on cum-dividend days and ex-dividend days, respectively. *DivYield* is the dividend yield; *Ln(MV)* is the natural log of the firm's market capitalization; *M/B* is the market-to-book ratio, *Nikkei225* is an indicator variable that is set equal to 1 for firms included in the Nikkei225 Index, and zero otherwise. Other variables are defined as in the Appendix. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively. Standard errors are reported in parentheses.

Panel A:

Dependent variable: Pr (Fee > 100 bp)						
	LPM		Logit Model with RE		Logit Model with FE	
	(1)	(2)	(3)	(4)	(5)	(6)
EVENT [-1, 0]	0.002***		0.245***		0.241***	
	(0.000)		(0.036)		(0.036)	
CumDay		0.002***		0.228***		0.225***
		(0.001)		(0.050)		(0.050)
ExDay		0.002***		0.264***		0.259***
		(0.001)		(0.049)		(0.049)
$DivYield_t$	-0.000	-0.000	-0.188***	-0.187***	-0.080***	-0.079***
	(0.000)	(0.000)	(0.014)	(0.014)	(0.016)	(0.016)
$Ln\ (MV)_{t-1}$	-0.001	-0.001	-0.321***	-0.321***	0.068**	0.069**
	(0.001)	(0.001)	(0.017)	(0.017)	(0.028)	(0.028)
M/B_{t-1}	0.000	0.000	0.007***	0.007***	0.002	0.003
	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)	(0.002)
$Turnovert_{-1}$	0.001***	0.001***	0.017***	0.017***	0.014***	0.014***
	(0.000)	(0.000)	(0.002)	(0.002)	(0.002)	(0.002)
IO	-0.000***	-0.000***	-0.023***	-0.023***	-0.006*	-0.006*
	(0.000)	(0.000)	(0.002)	(0.002)	(0.003)	(0.003)
Nikkei225	0.003	0.003	-0.821***	-0.821***	-0.012	-0.014
	(0.002)	(0.002)	(0.126)	(0.126)	(0.344)	(0.344)
Constant	0.034**	0.034**	3.906***	3.874***		
	(0.014)	(0.014)	(0.394)	(0.395)		
Year-Qtr Dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	870,138	870,062	870,138	870,062	613,053	612,984
R-squared (from LPM)	0.003	0.003				

Panel B:

Dependent variable: Pr (Fee > 250 bp)						
	LPM		Logit Model with RE		Logit Model with FE	
	(1)	(2)	(3)	(4)	(5)	(6)
EVENT[-1, 0]	0.001***		0.319***		0.315***	
	(0.000)		(0.075)		(0.075)	
CumDay		0.000*		0.214**		0.210**
		(0.000)		(0.107)		(0.107)
ExDay		0.001***		0.416***		0.409***
		(0.000)		(0.098)		(0.098)
$DivYield_t$	-0.000	-0.000	-0.135***	-0.135***	-0.053	-0.053
	(0.000)	(0.000)	(0.025)	(0.025)	(0.034)	(0.034)
$Ln(MV)_{t-1}$	-0.000	-0.000	-0.322***	-0.323***	0.105*	0.104
	(0.000)	(0.000)	(0.027)	(0.027)	(0.064)	(0.064)
M/B_{t-1}	0.000	0.000	0.009***	0.009***	0.004	0.004
	(0.000)	(0.000)	(0.002)	(0.002)	(0.006)	(0.006)
$Turnovert_{-1}$	0.000***	0.000***	0.013***	0.013***	0.010***	0.010***
	(0.000)	(0.000)	(0.003)	(0.003)	(0.003)	(0.003)
IO	-0.000***	-0.000***	-0.025***	-0.025***	-0.016**	-0.016**
	(0.000)	(0.000)	(0.003)	(0.003)	(0.008)	(0.008)
Nikkei225	0.000	0.000	-0.618***	-0.616***	-0.505	-0.504
	(0.001)	(0.001)	(0.215)	(0.215)	(0.642)	(0.642)
Constant	0.009*	0.010*	2.564***	2.581***		
	(0.005)	(0.005)	(0.649)	(0.649)		
Year-Qtr Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	870,138	870,062	870,138	870,062	375,362	375,314
R-squared (from LPM)	0.001	0.001				

Table 5: Probability of PCRs around dividend events

This table reports the results from linear probability models (LPM) and logit models with fixed effects (FE). The dependent variable, PR(PCR > 0) is a binary variable that equals 1 if stock *i* incurrs a PCR on day *t*, and 0 otherwise. EVENT[-1, 0] is an indicator variable that is set equal to 1 for observations made on cum-dividend days or ex-dividend days, and zero otherwise. *CumDay* and *ExDay* are indicator variables that are set equal to 1 for observatitons made on cum-dividend days and ex-dividend days, respectively. *DivYield* is the dividend yield; *Ln(MV)* is the natural log of the firm's market capitalization; *M/B* is the market-to-book ratio, *Nikkei225* is an indicator variable that is set equal to 1 for firms included in the Nikkei225 Index, and zero otherwise. Other variables are defined as in the Appendix. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively. Standard errors are reported in parentheses.

Dependent variable: Pr (PCR > 0)					
	LPM			Logit Model with FE	
	(1)	(2)	(3)	(4)	(5)
EVENT[-1, 0]	0.058***	0.059***		0.412***	0.398***
	(0.002)	(0.002)		(0.009)	(0.010)
CumDay			0.099***		
			(0.003)		
ExDay			0.018***		
			(0.002)		
$DivYield_t$		-0.022***	-0.022***		-0.157***
		(0.003)	(0.003)		(0.004)
$Ln(MV)_{t-1}$		0.075***	0.075***		0.579***
		(0.007)	(0.007)		(0.009)
M/B_{t-1}		-0.001	-0.001		-0.019***
		(0.000)	(0.000)		(0.002)
$Turnovert_{-1}$		0.001***	0.001***		0.016***
		(0.000)	(0.000)		(0.002)
IO		-0.004***	-0.004***		-0.025***
		(0.001)	(0.001)		(0.001)
Nikkei225		0.112*	0.112*		0.639***
		(0.061)	(0.061)		(0.049)
Constant	0.230***	-1.360***	-1.365***		
	(0.025)	(0.167)	(0.167)		
Observations	959,625	870,138	870,062	812,701	765,967
R-squared (from LPM)	0.050	0.058	0.059		

Table 6: Market quality measures around dividend events

This table reports the results from panel regressions. The dependent variables are pecent quoted spread (*PQS*), quoted spread (*QS*), stock turnover (*Turnover*), Amihud's (2002) illiquidity measure (*ILLIQ*), and premium charge rate (or *Gyaku-hibu, PCR*), as well as the indicator variables for specific days – cum-dividend day (*CumDay*), ex-dividend day (*ExDay*), one day before dividend record day (*RecDay_1*), dividend record day (*RecDay*), one day after dividend record day (*RecDay1*), and two days after dividend record day (*RecDay2*) – are all as defined in the Appendix. All models include dividend fixed effects. Samples are stratified into those with low and high market capitalization groups (*Low MV* and *High MV,* respectively) – based on Dixon et al. (2021), firms are grouped into the *Low MV* (*High MV*) group if their market caps are below (above) the 5th decile. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively. t-stats are reported in parentheses.

	PQS		*QS*		*Turnover*		*ILLIQ*		*PCR*	
	Low MV	*High MV*	*Low MV*	*High MV*	*Low MV*	*High MV*	*Low MV*	*High MV*	*Low MV*	*High MV*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CumDay	0.00145***	0.00130***	1.517***	2.252***	0.112***	0.147***	0.987	0.362	0.339***	0.511***
	(27.80)	(29.32)	(19.73)	(15.51)	(13.00)	(7.95)	(1.38)	(1.38)	(27.26)	(35.67)
ExDay	0.000527***	0.000479***	0.477***	0.529***	0.0428***	0.0317*	1.107	0.288	-0.00310	-0.0793***
	(11.08)	(12.26)	(8.73)	(3.63)	(4.78)	(2.22)	(1.29)	(1.15)	(-0.78)	(-18.99)
RecDay_1	0.000352***	0.000503***	0.390***	0.836***	-0.00481	-0.0123	1.092	0.260	-0.0288***	-0.0304***
	(8.00)	(12.81)	(7.06)	(4.91)	(-0.61)	(-0.91)	(1.25)	(1.10)	(-7.27)	(-6.84)
RecDay	0.00163***	0.00134***	1.660***	2.149***	-0.0299***	-0.0352*	1.132	0.316	-0.00110	-0.0317***
	(30.52)	(24.25)	(23.02)	(13.90)	(-4.94)	(-2.52)	(1.28)	(1.18)	(-0.30)	(-8.05)
RecDay1	0.000174***	0.000180***	0.127*	0.249	0.00283	0.0151	0.875	-0.350	-0.0170***	-0.0548***
	(4.50)	(4.23)	(2.47)	(1.90)	(0.32)	(0.83)	(1.09)	(-0.93)	(-5.04)	(-15.30)
RecDay2	0.000114**	0.000129***	0.133*	-0.315**	0.00289	0.0170	0.903	-0.353	0.151***	0.315***
	(3.21)	(4.00)	(2.53)	(-2.74)	(0.28)	(0.93)	(1.11)	(-0.91)	(23.54)	(35.48)
_cons	0.00551***	0.00450***	4.741***	7.548***	0.414***	0.578***	3.003***	1.359***	0.323***	0.479***
	(2204.08)	(1899.78)	(980.46)	(1038.05)	(762.63)	(492.59)	(36.55)	(149.10)	(912.34)	(1260.67)
Dividend FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1,217,797	1,300,117	1,217,797	1,300,117	1,221,826	1,267,540	1,137,016	1,190,092	1,217,558	1,208,965
R-squared	0.262	0.450	0.053	0.783	0.124	0.105	0.242	0.135	0.184	0.190

Appendix: Variable definitions.

Firm characteristics			
Variable	Unit	Definition	Source
MV (in millions)	yen	Market capitalization.	QUICK
CumPrice	yen	Closing price on cum-dividend day.	QUICK
IO	%	Institutional ownership. (*Financial_Inst_own* reported by Markit.)	Markit
SI	%	Short interest.(*Short_Selling_Quantity* reported by Markit.	Markit
Div	yen	Dividend amount.Yen value of cash dividend.	QUICK
DY	%	Dividend yield. Dividend scaled by cum-day price.	QUICK
Lending market conditions from Markit			
Fee	bps	Yen-weighted average indicative lending fee charged across all loans outstanding for a given stock-day (annualized in basis points).	Markit
Fee Range	bps		Markit
SharesOnLoan	%	Yen value of shares lent divided by firm market cap.	Markit
SharesAvalable	%	Yen value of shares available for lending divided by firm market cap.	Markit
UtilRate	%	The value of assets on loan from lenders divided by the total lendable value.	Markit
LoanAge	days	The weighted average number of days from start date to present for all transactions. (*Averagetenure* reported by Markit).	Markit
NewTransactions	cases	Number of transactions from all start dates (*Transactioncount* reported by Markit).	Markit
Market quality measures			
PQS	%	bid-ask spread scaled by bid-ask mid price	Datastream
QS	yen	bid-ask spread, or ask price minus bid price	Datastream
Turnover	%	Turnover ratio. Calculated by dividing the trading volume by number of shares issued.	QUICK
ILLIQ	%	Amihud's (2002) illiquidity measure, calculated by computing the monthly average of the absolute value of the daily return divided by the trading value on the day.	QUICK
Gyaku-hibu (or PCR)	yen	Gyaku-hibu, or Premium Charge Rate from JSF Auction	QUICK