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# Short Covering Trades

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## Abstract

Short sellers are known to have private information about security prices. Empirical evidence of short selling, however, is based on only half of short sellers' trading activity; specifically, the opening of the position. Using disclosed large-short-position data from the Japanese stock market, we provide the first detailed evidence of covering trades and find a positive reaction to short covering that only partially reverses. Although these results are consistent with substantial transaction costs for closing large short positions, they also reveal that some short sellers are privately informed about positive future events and have timing ability in covering positions.

## I. Introduction

Short sales are considered economically important trades that are essential for providing liquidity and distilling information in the market (Boehmer, Jones, and Zhang (2008), Boehmer and Wu (2013), Diether (2009), Engelberg, Reed, and Ringgenberg (2012), and Massa, Zhang, and Zhang (2015)). Yet, data limitations still constrain our understanding of short sellers' trading strategies. A short-sale transaction consists of at least two opposing trades: one involving the actual short sale and one in which the short seller purchases shares to cover the position.[1] Although conventional wisdom ascribes substantial positive price impact to

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[1]When naked shorting is prohibited, in addition to the sell and buy in trades, an underlying securities lending/borrowing transaction facilitates the delivery of the stocks sold by short sellers. The availability of the shares and the cost of the borrowing are generally considered direct short-sale constraints (Autore, Boulton, and Braga-Alves (2015), Jones and Lamont (2002), and Saffi and Sigurdsson (2011)).

covering trades, existing analyses of short selling focus exclusively on the trade that establishes the short position.

Trades covering large short positions are possibly associated with transient, positive returns that reflect the temporary price impact of large buy orders. In addition, covering trades may also convey new information. Short sellers are expected to cover their trades when the overvaluation has been corrected or when new private information indicates undervaluation. Thus, stock prices should not further decline after covering trades. However, short-sale constraints may alter the price behavior around short coverings. When adverse price movements or securities lending market constraints force short sellers to cover the positions prematurely, stock prices can continue to decline after the coverings (Jarrow (1992), Lamont and Stein (2004), and Savor and Gamboa-Cavazos (2014)).

Interestingly, to our knowledge, the overall market impact of short covering trades remains an open empirical question because we lack detailed positions information. Our study addresses this shortcoming in the literature by providing the first comprehensive analysis of short coverings using a previously unexplored data set containing reports on short sellers' positions in stocks listed on the Tokyo Stock Exchange (TSE). Since Nov. 7, 2008, the Japanese Financial Securities Authority has mandated disclosures of short positions in excess of 0.25% of the total shares outstanding for all TSE-listed stocks.[2] We hand-collected data on all disclosed large positions from Nov. 11, 2008, when the data were first available, until Sept. 30, 2010. Our sample consists of 4,133 reported positions in 889 stocks during a period in which short selling was prevalent in the Japanese stock market.

We first examine the stock performance around large cover trades and find significant positive return effects. Using regression analyses, we find that the excess return is 0.32% on the day of the covering trade. However, a third to a quarter of the return is reversed during the subsequent trading week, consistent with the transient liquidity effect (Hasbrouck (1991)). The remaining persistent positive return effect provides evidence of trade innovation from short sellers' withdrawal. Thus, short sellers not only have negative private information when establishing short positions as documented in the literature, we show that they also use positive private information in covering trades.

We further analyze positive returns after the covering trades by considering heterogeneity among short sellers. Although short sellers are informed investors in general, certain shorts may be unprofitable if adverse price movement forces the positions to be covered. Moreover, whereas conventional short sellers profit when stock prices decline, some short positions may be part of an arbitrage or hedging strategy and are not motivated by significant overvaluation.

We address heterogeneity among short sellers by using variations in position returns and by considering the aggregate shorting in the specific stocks.

[2]In the wake of the 2008 financial crisis, a number of exchanges introduced disclosure regimes requiring short sellers with a net short position above a certain threshold to disclose their position, as long as the position is not closed out or significantly reduced. Although the threshold requirement varies across countries, most exchanges require the disclosure of large short positions exceeding 0.20% or 0.25%. Some markets limit the disclosures to financial firms or other specific securities, whereas many report only the total outstanding shorts or the total number of shares on loan at some regular interval.

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We find that the significant positive returns up to 6 months after the covering trades are robust among the better-performing large short positions. These results are consistent with the framework of Easley and O'Hara (1987) stating that informed traders are more willing to trade large positions and that short sellers who successfully identify overvalued stocks efficiently time the covering of the position before price run-up, thus evading dilution of their trading profits. Furthermore, we show that covering trades for stocks with lower aggregate shorting have higher post-covering returns. Because short sellers, as a group, are generally considered informed traders, the covering of one specific large disclosed short position conveys a more positive signal to the market when it agrees with the group's opinion.

We also consider the role of short-sale constraints in covering trades. Although we find that the reported large short positions are generally covered following return run-up, we find no evidence of a large systematic return decline after coverings. Within our sample of stocks with large disclosed short positions, the lending fees and supply constraints have no material effect on the closure and are also not important in explaining the cross-sectional differences in post-covering returns. This finding suggests that adverse market conditions do not force most short sellers in our sample to cover.

Last, we differentiate between the various types of institutions and show that brokerage firms are more efficient than other institutions in covering positions before large return run-up. This finding implies that either highly informed short sellers use brokerages to conceal their identities or that the brokerage's proprietary trading desks, with better access to time-sensitive market information and effective internal research, place more efficiently timed covering trades.

In addition to examining returns, we explore the underlying determinants for the duration of large short trades by estimating a Cox proportional hazard model for the exit (cover decision) of short sellers. We find that on any given day, an open short position is more likely to be covered when liquidity improves, share turnover increases, the position becomes more profitable, or the aggregate short selling in the stock declines. The effects of turnover and liquidity are as expected: Short sellers in our sample are large traders, so they would logically seek liquid, active periods to conduct their covering trades. Profit taking and the relation of individual covering trades to aggregate shorting levels both indicate that strategic decisions and considerations of other short sellers' behavior at least partially determine covering trades.

Overall, we offer two contributions to the short-sale literature. First, we provide systematic analyses of covering trades for large short positions using a unique hand-collected database and show that on average there is significant positive transient and permanent price impacts associated with these trades. We suggest that this information should be considered in conjunction with the negative returns associated with the opening of the short positions when interpreting the net market impact of short sales. Second, we provide new insights regarding short sellers' timing ability, a crucial trading skill largely overlooked in the short-sale literature. We show that large shorts are covered efficiently with small price impacts, after mispricing is corrected or before large price run-ups occur.

The remainder of this article is organized as follows: Section II provides a literature review and develops the hypotheses. Section III describes the data and shows the summary statistics. The empirical results are presented in Section IV, and concluding comments are given in Section V.

## II. Literature Review and Hypotheses Development

### A. Literature Review

Short-sale studies find that short sellers, on average, are informed traders who can predict future bond yield spreads (e.g., Kecskés, Mansi, and Zhang (2013)) and stock returns (e.g., Asquith, Pathak, and Ritter (2005), Desai, Ramesh, Thiagarajan, and Balachandran (2002), and Diether (2009)) and facilitate price discovery (e.g., Boehmer and Wu (2013)). Although short sellers, as a group, are considered to be informed and skilled traders, there is heterogeneity across the traders and the information content of their trades. For example, among the institutional shorts, the nonprogram institutional traders' positions are associated with the most negative future returns (Boehmer et al. (2008)). Moreover, other than overvaluation, motivations for short selling include tax, arbitrage, and hedging. Brent, Morse, and Stice (1990), using a subsample of New York Stock Exchange (NYSE) stocks, show that arbitrage is the most prevalent reason. In a set of complementary findings, Choi, Getmansky, and Tookes (2009) provide evidence of active short selling in the convertible bond market and suggest that short sellers are essential for price discovery in the market. Still, the academic consensus is that short sellers, as a group, trade on stock-specific valuation and short overvalued stocks, and they carefully avoid shorting undervalued ones (Boehmer, Huszár, and Jordan (2010)).

Short-sale studies that focus on the pricing implications of short-sale constraints show that mispricing can persist when shorting is restricted or too costly (Bris, Goetzmann, and Zhu (2007), Saffi and Sigurdsson (2011)). In many cases, short sellers may be unable to correct overvaluation because limited supply, high lending fees, or adverse market conditions restrict short selling. For example, high market sentiment can push already-overpriced stock prices to an even higher level (Lamont and Stein (2004)), a result consistent with the findings of Stambaugh, Yu, and Yuan (2012) that the anomalies are stronger on the short side following high sentiment because capital constraints prevent arbitrageurs on the short side from effectively correcting mispricing. To make matters worse for short sellers, they can be squeezed out by manipulative traders who instigate large buy-ups and profit from the temporary positive price impacts (Jarrow (1992)). In a recent study, Jank, Roling, and Smajlbegovic (2016) also argue that the transparency requirements of short positions can be a short-sale constraint and have pricing implications.

Although the short-sale literature generally agrees that short sellers have stock-picking ability and can identify overvalued stocks, little attention has been paid to their heterogeneity and timing ability. Three notable exceptions are Boehmer et al. (2008), Jones, Reed, and Waller (2016), and Jank and Smajlbegovic (2017). Boehmer et al. (2008) use unique trade-level data to differentiate across traders at the opening of the short sale but cannot capture the entire

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position or provide insights about the covering trades. Jones et al. (2016) rely on daily disclosed large short positions in excess of a specific reporting threshold on European exchanges and show that during the European debt crisis, short sellers focused on financial firms, particularly around rights issuance. Similarly, Jank and Smajlbegovic (2017) examine the disclosed large short positions in Europe and find that hedge funds have more profitable positions than do other short sellers.

Although recent studies use unique data to provide new information about short strategies, they still predominantly focus on the opening of the trade. Jank and Smajlbegovic (2017) analyze realized profits but capture only the fraction of the position above a certain threshold rather than the full short position. More important, the market impact of the trade closure is still largely ignored. If the decision regarding when to cover the short position is based on private information, the associated price impact can affect the interpretation of the preceding negative price adjustment, which supposedly makes the price more accurate. Moreover, if short-sale constraints play a role in covering decisions, short sellers can be good stock pickers but not necessarily good market timers.

## B. Hypotheses

Conventional wisdom among traders ascribes a strong positive price effect to covering trades that could change the interpretation of earlier results. In particular, a robust positive price reaction to a covering trade may offset the initial negative impact associated with establishing the short position. This would imply that the effect of short selling is partly transient, rather than permanent, and thus not information based. We empirically test this prediction in the first hypothesis:

*Hypothesis 1.* Short coverings are associated with positive returns.

In the short term, positive transient price impact is expected in the absence of the arrival of new information because of the coverings of large short positions. Two factors contribute to the transient price impact. First, the covering trade is large because the short position is at least 0.25% of the shares outstanding, whereas the average daily turnover for shorted stocks is 0.57%. Second, the market knows the size of each trader's short position from the public notifications and can exploit that information once the trader is expected to start covering. Both uninformed trading and order anticipation trading can create a positive return around the covering date, which is reversed once liquidity is replenished. Whether covering trades are contrarian is unclear because short sellers do not face requirements to trade passively in covering trades as they would for the actual shorting transaction in markets with uptick rules for short selling.

Next, we analyze long-term impacts regarding the trade innovation component of the return following covering (Hasbrouck (1991)). To shed light on the information component of the covering trades, we consider the following question: Do short sellers strategically close their positions, or are they forced? We differentiate between the two outcomes for coverings with Hypotheses 2A and 2B.

*Hypothesis 2A.* Short sellers exploit privileged information sources, resulting in coverings once overpricing is corrected.

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Significant price decline generally follows large short trades or large increases in the aggregate shorting demand (Boehmer et al. (2008), Diether (2009)). These results suggest that short sellers initiating these trades possess private information or can process information more rapidly and efficiently (Engelberg et al. (2012)). In general, if short sellers are considered relatively informed by being able to identify overvalued stocks, they should be able to determine when the mispricing is corrected and effectively time their trades. In the absence of external constraints for short sellers, we specifically argue that at the time of the covering, stocks should be either correctly priced or underpriced if new information arrived while the trader held the position.

However, adverse market conditions may cause a different outcome, leading to our second, competing hypothesis:

*Hypothesis 2B.* Short sellers are forced to close out positions prematurely; thus, stock prices have a persistent downward trajectory following short coverings.

Three main factors could force short sellers to leave money on the table and prematurely close out positions: i) adverse price movements (large losses or manipulative traders' short squeeze makes the short position too expensive to maintain), ii) short-sale constraints from the securities lending market, or iii) behavioral biases. Specifically, positive price jumps would trigger margin calls for the short sellers, which could make the position too costly to maintain and force the short seller to cover the position, at least partially, to reduce the costs or generate cash to meet the margin call. If the overpricing has not been fully corrected after a transient price jump, the stock price will continue to decline until it converges to fundamentals.

The price impacts of forced covering from securities lending market conditions and behavioral biases are similar. Short sellers may not close out the specific unprofitable position affected by short-sale constraints; instead, the well-known disposition effect may cause them to close the more profitable one (von Beschwitz and Massa (2017)). This would generate a substitution effect within the portfolio of the short sellers and would impede our ability to empirically examine the link between short-sale constraints and the premature closing of short positions.

In addition to the market impact of short coverings, we also aim to provide new insight into the duration of short-sale trades. Specifically, we ask: What determines the cover decisions and the duration of the short position? This allows us to compare our findings with previous work showing that short sellers are contrarians (Diether (2009)), are informed when they initiate trades (Boehmer et al. (2008)), and have trades that are followed by negative price adjustments that make prices more informationally efficient (Boehmer and Wu (2013)).

## III. Data and Descriptive Statistics

### A. Sample Construction

Since Nov. 7, 2008, the Japanese Financial Securities Authority has required all individual and institutional short sellers to disclose large short positions that exceed 0.25% of the shares outstanding for a stock. Short sellers must report any changes in their aggregate position above the threshold, including covering

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transactions that reduce their position to below the threshold. Thus, the reports fail to tell when the position first opened. They indicate only when the most recent short sales pushed a trader's overall short position over the reporting limit. Shorts and covers are reported as long as the position exceeds the threshold; therefore, the last reported covering trade could, in principle, leave a substantial position below the threshold. This limitation prevented us from estimating the actual returns of short positions because the return in the buildup and wind-down may not be reported.

We combined the daily reports released by the TSE between Nov. 11, 2008, the date of the first large-short-position report, and Sept. 30, 2010, to create a panel of large daily institutional short positions. Overall, 176 institutions report at least one large short position in excess of 0.25% of the total shares outstanding, resulting in 4,832 disclosed short positions. To reduce noise in the data, we excluded infrequently trading institutions and organizations (e.g., Buddhist temples or small businesses) that reported fewer than 20 positions during the sample period.

Our final sample comprises 31 institutions, including well-known international securities and asset management firms such as Goldman Sachs and Deutsche Bank Securities, and Japanese brokerage houses such as Nomura Securities and Mitsubishi UFJ. The reports accounted for more than 85% of the total reported positions (4,133 of 4,832 positions). Furthermore, the institutions in our sample reported short positions in 889 stocks, a significant fraction of the 920 distinct stocks that have at least one report in the original data, including infrequent trading institutions. Appendix A shows the monthly time series of the total large short positions captured in the data, and Appendix B presents the 31 institutions with the relevant summary statistics of their positions.

The TSE requires that short position reports are filed by day $t+2$ relative to the trade date $t$. About 16% of the reports, however, are 1 day early; 3% are 1 day late; and 1% are filed on the trade day. Thus, for about 80% of the reports, the actual trading day is 2 days before the report day. This timeline is important for properly interpreting the price movements around the reporting dates. Finally, for 28 of 4,133 reports, the trade date is not included in the filings. For these reports, we assume that the trade takes place 2 days before the reporting date.

To control for aggregate shorting, we use the number of shares out on loan from Data Explorers (now IHS Markit Securities Finance). To construct a measure of shorting difficulty, we use the number of shares available for lending relative to the shares outstanding. We complement our dataset with daily stock prices, trading volume, daily return, and annual financial information from FactSet (e.g., sales, asset, book value, and institutional ownership).

## B. Descriptive Statistics

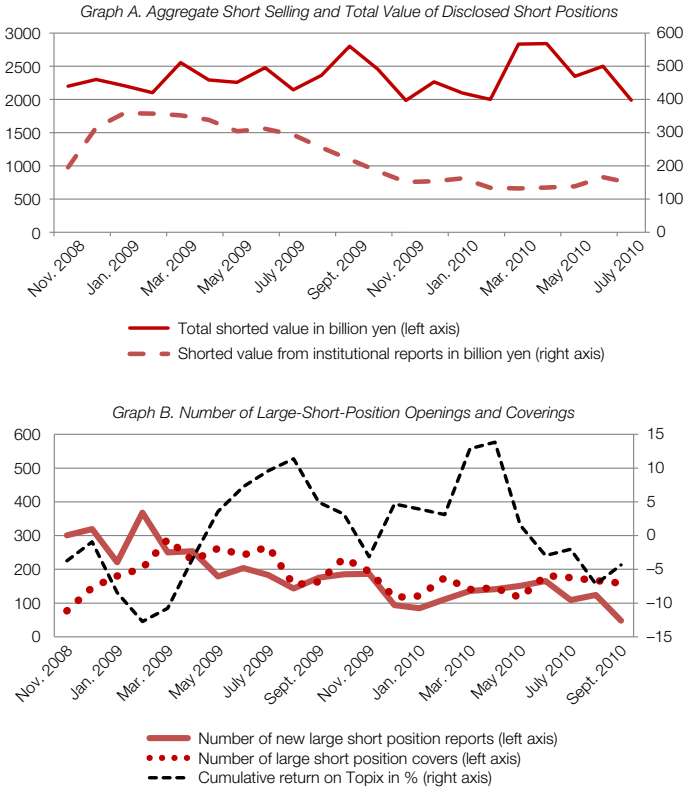
Figure 1 shows the time trend of the aggregate market shorting and the total reported shorting activity in Japan during our sample period. In Graph A, the outstanding total value of short positions was approximately JPY 2.2 trillion, whereas the market value of the reported large short positions was about JPY 250 billion.[3]

[3]During the corresponding period, the average daily turnover on TSE was 2.7 trillion, and the total market capitalization was about JPY 307 trillion. The total shorted value is approximated by the total value of the stocks out on loan, as reported by IHS Markit Securities. Although stocks are borrowed

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FIGURE 1
Shorted Value and the Number of Openings and Coverings

In Graph A of Figure 1, we show the time series of the aggregate short selling and total value of short positions based on disclosed reports by active institutions. In Graph B are the number of large-short-position openings and coverings by month as well as the cumulative returns of the Tokyo Stock Price Index in our sample period.




Overall, we have 4,133 positions in the sample, and on average, at any point in time, about 250 positions are open, with about 180 new openings and closures per month. The data collection began on Nov. 11, 2008, so a peak of 301 reported positions occurred during the first month. Smaller numbers are listed for the total and new positions for the last months because we exclude positions not closed out by Sept. 2010. (Appendix A provides more details about the time series of the position coverage.)

Of the 1,570 TSE-listed stocks in our sample, 920 have at least one short report. Of those 920 stocks, 31 are shorted only by inactive institutions and are excluded from the sample. The remaining 889 stocks are shorted at least once by an active institutional short seller. Table 1 shows the characteristics of these

for various reasons, the most common is to facilitate short selling in the presence of prohibited naked short selling. Thus, stocks on loan are often used as proxies for short selling.

TABLE 1

Descriptive Statistics of Listed Tokyo Stock Exchange Stocks from Nov. 2008 to Sept. 2010

Panel A of Table 1 summarizes financial information obtained at the end of the fiscal year. Panel B summarizes stock return characteristics at the daily level. In Panel A, MARKET_CAP is the number of shares outstanding times the daily stocks price in millions of yen. MARKET_TO_BOOK is the market capitalization relative to the book value of common equity at the end of the fiscal year. IO (%) and INSIDER (%) are the percentage of the total shares held by institutional investors and insiders, respectively. In Panel B, CLOSE_PRICE is the daily close price in yen. TURNOVER (%) is the daily traded shares relative to the total number of shares outstanding in percentage. BA_SPREAD is the daily average bid and ask price difference, scaled by the average of the daily bid and ask prices. RET (bps) and ADJ_RET (bps) are the daily raw return and return in excess of the market return. MM_ADJ_RET (bps) is the abnormal return from the market model, with betas estimated using the previous rolling 6-month daily returns. INSTSIR (%) is the total number of shorted shares from the disclosures relative to the total number of shares outstanding. SUPPLY (%) is the total number of shares available for lending relative to the total shares outstanding. AGGSIR (%) is the total number of borrowed shares as a percentage of the total shares outstanding. LENDING_FEE (bps) is the annualized fee to borrow the specific stock reported in basis points (bps). When comparing the means and medians between stocks with short reports and stocks without short reports, *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

| | Stocks with Large Short Reports ($N=889$) | | Stocks without Large Short Reports ($N=650$) | | | |
|---|---|---|---|---|---|---|
| Variable | Mean | Median | Mean | Median | Mean Difference | Median Difference |
| *Panel A. Comparison of Annual Financial Information of Stocks with and without Large-Short-Sale Reports* | | | | | | |
| MARKET_CAP | 177,712 | 52,077 | 181,014 | 21,367 | 0.11 | −10.12 |
| MARKET_TO_BOOK | 1.1508 | 0.9270 | 0.908 | 0.708 | −3.57*** | −10.22*** |
| IO (%) | 13.1758 | 11.5584 | 7.157 | 4.986 | −15.03*** | −14.14*** |
| INSIDER (%) | 37.5422 | 36.1879 | 43.659 | 43.014 | 7.57*** | 7.19*** |
| *Panel B. Comparison of Daily Stock Trade Characteristics of Stocks with and without Large-Short-Sale Reports* | | | | | | |
| CLOSE_PRICE | 8,176 | 682 | 5,152 | 510 | −1.53 | −3.50*** |
| TURNOVER (%) | 0.5725 | 0.3938 | 0.2021 | 0.1317 | −14.31*** | −19.64*** |
| BA_SPREAD (%) | 0.5562 | 0.4009 | 0.8090 | 0.6188 | 8.53*** | 10.79*** |
| RET (bps) | 5.3800 | 4.6483 | 2.8311 | 2.3080 | −6.18*** | −5.91*** |
| ADJ_RET (bps) | 5.7830 | 5.0513 | 3.2341 | 2.7111 | −6.18*** | −5.91*** |
| MM_ADJ_RET (bps) | 5.8047 | 4.9559 | 3.3894 | 2.6268 | −5.89*** | −5.62*** |
| INSTSIR (%) | 0.1870 | 0.1004 | 0.0000 | 0.0000 | −22.08*** | −34.89*** |
| AGGSIR (%) | 1.0214 | 0.7364 | 0.2333 | 0.1421 | −20.98*** | −25.07*** |
| SUPPLY (%) | 4.0514 | 3.2460 | 2.9268 | 2.2224 | −7.51*** | −8.17*** |
| LENDING_FEE (bps) | 91.9777 | 45.4343 | 67.8938 | 43.5076 | −5.49*** | −1.56 |

stocks contrasted with those that do not appear in any report. Annual variables are in Panel A, and daily variables are in Panel B.

Market capitalization does not differ significantly between stocks with large disclosed positions and those without. However, the shorted stocks tend to have higher institutional ownership, lower insider holding, and higher market-to-book ratio. Panel B of Table 1 shows the daily characteristics for both groups. Stocks with large reported short positions trade more actively and are more liquid, as reflected by lower bid–ask spreads. During our entire sample period, the aggregate disclosed large shorts (INSTSIR) is 0.187% among stocks that have at least one reported large short position, implying that, on average, 0.187% of the total shares outstanding are shorted in large positions (INSTSIR is 0 for any day that a stock is not shorted in a large position).

In addition, we compute several measures of aggregate shorting using information from IHS Markit Securities. Percentage of total shares available for borrowing (SUPPLY) is a widely considered short-sale constraint measure (Saffi and Sigurdsson (2011)). AGGSIR measures aggregate shorting activity in the market by calculating the total number of borrowed shares as a percentage of the total shares outstanding. Not surprisingly, stocks included in the hand-collected sample have significantly higher aggregate shorting activity and are also easier to short (have greater SUPPLY).

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In Table 2 we present detailed summary statistics of our data because previous academic research has not used large disclosed short positions. In Panel A, we report that the mean (median) position value in the sample is ¥633 million (¥246 million).[4] On an average day, traders report short positions in 259 stocks. Our sample is drawn from the first section of the TSE with approximately 1,600 stocks, so positions are typically reported on about 20% of the stocks on any given day. The average daily raw and adjusted returns are 8.20 basis points (bps) and 7.10 bps, respectively. We use the Tokyo Stock Price Index (TOPIX), a capitalization-weighted index of all companies listed on the First Section of the TSE, to proxy for the market return. Adjusted returns are calculated by subtracting market returns from raw returns. We report an average of about nine new position openings and the same number of closures each day over the 23 months, suggesting that large-value short selling is relatively active during the sample period.

A unique feature of our data is that we can observe the period between the first crossing of the threshold (0.25% of shares outstanding) and the covering

TABLE 2

Descriptive Statistics of Reported Large Short Positions by Active Institutions from the Tokyo Stock Exchange from Nov. 2008 to Sept. 2010

In Panel A of Table 2, POSITION_VALUE is the average number of shorted shares reported times the daily share price for the outstanding reported large short positions (when the total number of shorted shares exceeds 0.25% of the total shares outstanding by any trader) in millions of yen. RET (bps) and ADJ_RET (bps) are the daily raw return and return in excess of the market return of all stocks that at some point during the sample period have large short positions reported by active institutions. NUMBER_OF_SHORTED_STOCKS_DAILY is the number of stocks with outstanding large short positions on average per day in the sample. NUMBER_OF_DAILY_OPENINGS and NUMBER_OF_DAILY_COVERINGS are the number of large short position openings and number of covering trades on average per day. Under the "By Stocks" heading, RET (bps) is the daily raw return, and ADJ_RET (bps) is the daily return in excess of the market return for stocks during the days in which disclosed large positions are reported. In Panel B, POSITION_VALUE is the average by position of the number of shorted shares times the corresponding day close share price in millions of yen. DURATION is the average number of days the short position is reported to the public above the threshold. RET (bps) is the average return of all short positions, where the returns are based on days that short positions are reported. VALUE_WEIGHTED_RET (bps) is the average returns across all positions weighted by the values of short positions.

*Panel A. Aggregate and by Stock Summary Statistics*

| Variable | *N* | Mean | Std. Dev. | Median |
|---|---|---|---|---|
| *Aggregate* | | | | |
| POSITION_VALUE (in ¥millions) | 157,685 | 632.52 | 1,559.41 | 245.61 |
| RET (bps) | 119,819 | 9.02 | 313.83 | 0.00 |
| ADJ_RET (bps) | 119,819 | 5.94 | 278.26 | −9.51 |
| NUMBER_OF_SHORTED_STOCKS_DAILY | 462 | 259.35 | 108.43 | 260 |
| NUMBER_OF_DAILY_OPENINGS | 458 | 9.02 | 8.60 | 7.50 |
| NUMBER_OF_DAILY_COVERINGS | 459 | 9.00 | 5.60 | 8.00 |
| *By Stocks* | | | | |
| RET (bps) | 889 | 8.20 | 55.29 | 7.25 |
| ADJ_RET (bps) | 889 | 7.10 | 49.76 | 5.66 |

*Panel B. By Position Summary Statistics*

| 4,133 Unique Positions | Mean | Std. Dev. | Median |
|---|---|---|---|
| POSITION_VALUE (%) | 0.3603 | 0.2621 | 0.2845 |
| POSITION_VALUE (in ¥millions) | 566.03 | 1,131.84 | 225.51 |
| DURATION (day) | 38.15 | 56.55 | 13 |
| RET (bps) | 405.17 | 2,390.28 | 27.06 |
| COVER_SIZE (%) | 0.1168 | 0.2312 | 0.0500 |
| VALUE_WEIGHTED_RET (bps) | 278.22 | | |

[4]The average USD/JPY exchange rate was ¥92.05 during our sample period.

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trade (a reduction to below the threshold). For simplicity, we refer to this period as the duration of the short position. However, it is not exactly equal to the holding period of the short position because we do not observe how long the short position remains below the threshold. In addition to the short positions, we also track price changes and other variables over this period. In Panel B of Table 2, we report the summary statistics across the 4,133 reported large short positions. At the position level, the mean duration is 38.15 trading days with a median of 13 days. The average covering trade size is 0.12% of the total shares outstanding, and the average position size is about 0.36%. This means that the average covering trade size is economically significant. Thus, we expect certain price impact.

The average raw return across all short positions is 405.17 bps, and the median is 27.06 bps. The positive returns represent losses to short positions between the time traders cross the threshold and cover their trades. Because we do not observe the short sales that take place before crossing the threshold, these positive returns do not imply that short selling generates losses overall. In particular, a decline in price between a trader's initial short sale and the subsequent accumulation of the large short position before crossing the threshold implies that the returns in Panel B of Table 2 may be different from the actual returns to short sellers.

## IV. Empirical Analysis

In this section, we provide the first comprehensive empirical evidence of short covering trades. We start with an event study in which we examine the market impact of covering trades on the surrounding days. Next, we examine the duration of large short positions using a Cox proportional hazard model and provide new insights about what influences short sellers' closing decisions. We then analyze the market reaction to large short covering trades in a panel-regression framework and address the heterogeneity of these trades.

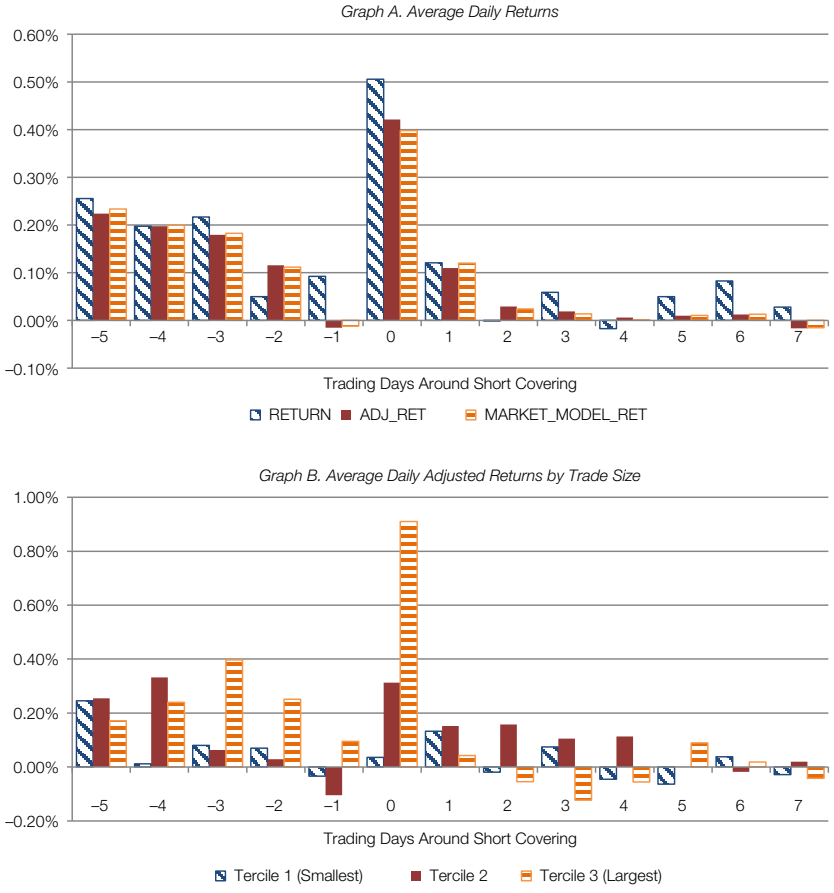
### A. Event Study of Short Covering Trades

To understand short sellers' covering decisions and the market impact of these trades, we examine short windows around the trade dates. Specifically, day 0 refers to the trade date, and we use the windows $[-5,-1]$, $[1,2]$, and $[3,7]$ to test what happens before and after covering trades. For most firms, the report date when the position information is revealed to the public falls within the $[1,2]$ window. We expect at least part of the price adjustment to take place around the trade. We focus our discussion of price effects on the adjusted returns, but we also report raw returns.

In Graph A of Figure 2, we plot returns, adjusted returns, and market-model returns around covering trades. In the week leading to the trade date (day 0), most days have positive returns, in contrast to the contrarian trading by short sellers shown by Diether (2009). These positive returns also indicate that margin calls as a result of rising prices may cause some sellers to close their positions. In Table 3, univariate tests show that the mean ADJ_RET$[-5,-1]$ is significantly positive, which also suggests that positive returns precede closures. However, note that the median ADJ_RET$[-5,-1]$ has a small magnitude (0.002%) and is not statistically significant. More important, Figure 2 shows a spike in returns

FIGURE 2
Returns around the Covering Trades

Figure 2 reports returns on the trading days around short covering. Graph A shows the average daily returns for all short positions. ADJ_RET is the daily return in excess of market return, and MARKET_MODEL_RET is the adjusted return using Market Model. Graph B shows the daily adjusted returns for terciles based on the size of covering trades (number of traded shares divided by number of shares outstanding). In all instances, covering is day 0.




on covering trade date, and Table 3 confirms that raw returns on day 0 are positive and statistically significant at the 1% level. Furthermore, the mean (median) adjusted returns of 0.421% (0.11%) on the trade day, day 0, are economically significant. Overall, there is a robust positive price reaction on the days of covering trades, which supports Hypothesis 1 that short coverings are associated with positive returns. Regarding the periods after covering trades, the medians ADJ_RET[1,2] and ADJ_RET[3,7] are negative, whereas the respective means are positive. These mixed results demonstrate that the positive price reaction on the days of covering trades is not fully reversed on the report day or afterward. These findings also suggest heterogeneity in the market impact of covering trades across the positions.

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TABLE 3

Descriptive Summary of Stock Returns around Covering of Large Short Positions

Table 3 displays the cumulative raw returns before and after the covering trades for the 4,133 unique positions. In Panel A, RET[−5, −1] is the cumulative returns for the 5 days prior to cover, and RET[0] is the daily raw return on the actual cover date. RET[1,2] and RET[3,7] are the cumulative returns for the first 2 days after the cover and the subsequent 5 days. For each window, ADJ_RET is the adjusted return, which is the difference between returns and market returns. Panel B reports the 1-, 3-, and 6-month returns and adjusted returns after the covering trades. For the mean and median values, *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

| Variable | Mean | *p*-Value | Median | *p*-Value |
|---|---|---|---|---|
| *Panel A. Short-Term Returns (%)* | | | | |
| RET[−5, −1] | 0.873*** | <0.001 | 0.156** | 0.048 |
| ADJ_RET[−5, −1] | 0.753*** | <0.001 | 0.002 | 1.000 |
| RET[0] | 0.510*** | <0.001 | 0.223*** | <0.001 |
| ADJ_RET[0] | 0.421*** | <0.001 | 0.111*** | 0.006 |
| RET[1,2] | 0.120 | 0.125 | 0.000 | 0.543 |
| ADJ_RET[1,2] | 0.143** | 0.041 | −0.097* | 0.099 |
| RET[3,7] | 0.204* | 0.089 | −0.272* | 0.076 |
| ADJ_RET[3,7] | 0.036 | 0.729 | −0.328*** | <0.001 |
| *Panel B. Long-Term Returns (%)* | | | | |
| 1_MONTH_RET | 1.893*** | <0.001 | 0.240 | 0.181 |
| 1_MONTH_ADJ_RET | 1.031*** | <0.001 | −0.130 | 0.419 |
| 3_MONTH_RET | 5.674*** | <0.001 | 1.515*** | <0.001 |
| 3_MONTH_ADJ_RET | 2.936*** | <0.001 | −0.103 | 0.803 |
| 6_MONTH_RET | 9.378*** | <0.001 | 3.121*** | <0.001 |
| 6_MONTH_ADJ_RET | 4.648*** | <0.001 | 0.558* | 0.099 |

To further examine stock prices post-covering trades, we calculate returns for longer horizons, specifically for the 1-, 3-, and 6-month horizons after the coverings. The mean adjusted returns are positive and significant, but the median adjusted returns are negative for the 1- and 3-month horizons. For the 6-month horizon, both the mean and median adjusted returns are positive and significant, although only at the 10% level for the median. Thus, we can rule out return reversals and also provide further evidence that, on average, short sellers are informed in their covering trades. This finding is consistent with Hypothesis 2A that short sellers use private information in closing their positions. Although we find no evidence supporting the alternative Hypothesis 2B that shorts sellers on average are forced to cover prematurely, the differences in mean and median returns at the 1- and 3-month horizons suggest that market impact varies across covering trades.

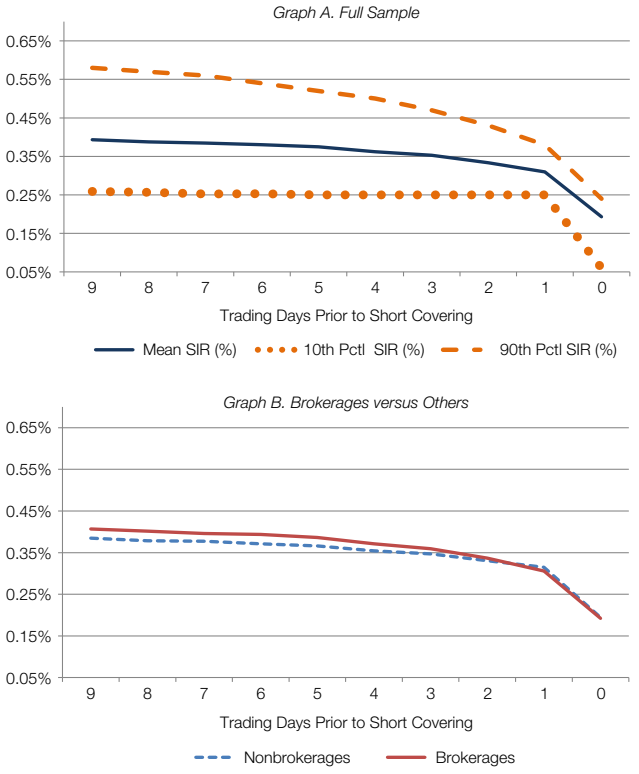
Figure 3 illustrates the unwinding of the positions. In Graph A, we show that on average the short positions are gradually reduced, consistent with short sellers trying to reduce transaction costs. More important, there is a larger reduction in the short position on the day of the covering trade, indicating the importance of covering trade days. We also note that small trades prior to the large covers suggest that many short sellers have already decided to close their positions days ahead and therefore are not forced to close.

In Graph B of Figure 3, we differentiate across the active short sellers in our sample by comparing the same 10-day window prior to coverings between brokerage firms and other institutions. These large investment firms with brokerage service may be in better positions to time trades because they have information from their informed clients and their proprietary trading desks. Interestingly, we see a similar magnitude and gradual decline in the positions by brokerage firms

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FIGURE 3
Position Size before the Covering Trades

Graph A of Figure 3 shows the overview of the short position decline before the covering trade (covering is day 0) based on full sample. In Graph B, we compare the declines of short positions of brokerages to those of other institutions.




as in those by other institutions, suggesting no significant difference in covering between nonbrokerage and brokerage firms.

## B. Determinants of Short Sellers' Holding Period

In addition to understanding returns around covering trades, we desire a better understanding of short sellers' trading strategies. We use duration analysis to answer the following question: What determines when short sellers cover their positions? We assume that the day of the opening report is the first day when short sellers are at risk of exit by closing their positions. As noted, we cannot measure the actual position buildup that leads to the first (opening) report, so the report date is the first date at risk. The exit (closure) date refers to the date on the last report representing the covering trade.

We examine the decision to cover, which is conditional on having reported the opening at time 0 and on the existing short position at time $t$. We have multiple positions and corresponding events for most of the stocks, so to estimate the survival of these positions over time, we must allow for cross correlation within

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stock observations. Thus, we report the coefficient estimates with the standard errors and the corresponding hazard ratios for time-variant and time-invariant variables from a Cox proportional hazard model that allows for the correlation between the observations within each stock and for the variation in the log hazard function across stocks. Time-varying covariates include the cumulative reported return of the position (POSCUM_RET), total large shorts by short sellers in our sample (INSTSIR), aggregate shorting activity in the market (AGGSIR), the percentage of total shares available for borrowing (SUPPLY), turnover (TURNOVER), bid–ask spread (BA_SPREAD), and market return (MARKET_RETURN). The time-varying covariates are calculated on the previous day and change daily for each short position. The time-invariant covariates (market capitalization, market-to-book, insider ownership, and institutional ownership) remain unchanged for each position and are calculated on the day the large position is first reported. However, these time-invariant variables change across positions for the same stock.[5]

We begin by examining the effect the return of the short position has on the probability of exiting, from the opening to the covering date. The estimated coefficient on the position return variable ($POSCUM_RET_{-1}$) is −0.1377 and significant at the 10% level (see model 1 in Table 4). The hazard ratio of 0.87 implies that a 1% increase in the cumulative position return reduces the exit probability by 13% (1.00–0.87). An increasing position return implies an increasing loss to short sellers; therefore, the probability of observing a covering decision declines with greater position losses. Examining the time-invariant firm characteristics, we note that exit probability is higher, ceteris paribus, for firms that are larger and that have higher market-to-book, greater institutional ownership, and lower insider ownership.

These findings are robust to adding other time-varying covariates in models 2–4 of Table 4. Interestingly, the estimated coefficients of the short-sale-related time-varying covariates suggest that covering is more likely when either the aggregate disclosed large shorts (INSTSIR) reduces or the total short supply (SUPPLY) lessens. In other words, short sellers tend to cover their positions when reported short-selling activities are reduced in the same stock. On the impacts of stock-related time-varying covariates, short positions tend to be closed when turnover (TURNOVER) increases or the bid–ask spread (BA_SPREAD) decreases, indicating that the stock's trading also affects the covering decision. We also find that the overall market condition impacts short sellers because covering is more likely when market return (MARKET_RETURN) is higher.

In summary, our findings suggest that covering is more likely when the short position is more profitable, which could be interpreted as a "disposition" effect where short sellers prefer to cover positions that allow them to book trading profits. Also, covering is more likely when the market is liquid, consistent with the earlier observation that the covering decision is associated with substantial transient price impacts and thus high transaction costs. To mitigate the price

[5]For robustness checks, we rerun the analysis excluding stocks with five or fewer observations and find results similar to those reported in Table 4.

TABLE 4

Cox Proportional Hazards Model for the Duration of Large Reported Short Positions

In Table 4, for each short position, conditional on having reached the threshold (0.25% of the number of shares outstanding), we estimate the hazard rate of exiting the large short position. The time-varying covariates are as follows: POSCUM_RET$_{-1}$ (in decimal) is the raw cumulative return on the stock on the previous trading day since the opening of the position; INSTSIR$_{-1}$ is the shorted shares from disclosed institutional reports relative to the shares outstanding 1 day before; AGGSIR$_{-1}$ is the total number of shorted shares (from all positions) relative to shares outstanding 1 day before; and SUPPLY$_{-1}$ is the shares available for shorting relative to total shares outstanding on the previous day, TURNOVER$_{-5,-1}$ and BA_SPREAD$_{-5,-1}$ are the average daily turnover and the average bid–ask spread during the previous 5 days, and MARKET_RETURN$_{-1}$ is the return using the Tokyo Stock Price Index on the previous day. The time-invariant variables do not change for the duration of a specific position and are as follows: ln(MARKET_CAP) is the natural logarithm of the number of shares outstanding in millions times the daily shares price in yen; MARKET_TO_BOOK is the market capitalization relative to the book value of common equity; and IO and INSIDER are the number of shares held by institutions and by insiders, respectively, relative to the total shares outstanding in percentage. We report coefficients and hazard ratios from the Cox model with the associated standard errors (in square brackets) adjusted for clustering by stocks and allowing for the variation in the log hazard function across stocks. The estimation uses 4,133 positions with an average duration of 38 days. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

| | Model 1 | | Model 2 | | Model 3 | | Model 4 | |
|---|---|---|---|---|---|---|---|---|
| Variable | Coefficient / [SE] | Hazard Ratio | Coefficient / [SE] | Hazard Ratio | Coefficient / [SE] | Hazard Ratio | Coefficient / [SE] | Hazard Ratio |
| *Time-Varying Covariates* | | | | | | | | |
| POSCUM_RET$_{-1}$ | −0.1814* | 0.8341 | −0.2551** | 0.7749 | −0.2263** | 0.7975 | −0.2083* | 0.8120 |
| | [0.1053] | 0.8341 | [0.1090] | 0.7749 | [0.1097] | 0.7975 | [0.1081] | 0.8120 |
| INSTSIR$_{-1}$ | | | −0.0964*** | 0.9081 | | | | |
| | | | [0.0340] | 0.9081 | | | | |
| AGGSIR$_{-1}$ | | | | | −0.0054 | 0.9946 | | |
| | | | | | [0.0135] | 0.9946 | | |
| SUPPLY$_{-1}$ | | | | | | | −0.0192*** | 0.9810 |
| | | | | | | | [0.0067] | 0.9810 |
| TURNOVER$_{-5,-1}$ | | | 0.0263*** | 1.0266 | 0.0254*** | 1.0257 | 0.0242*** | 1.0245 |
| | | | [0.0087] | 1.0266 | [0.0080] | 1.0257 | [0.0078] | 1.0245 |
| BA_SPREAD$_{-5,-1}$ | | | 0.0021 | 1.0021 | 0.0042 | 1.0042 | 0.0027 | 1.0027 |
| | | | [0.0426] | 1.0021 | [0.0421] | 1.0042 | [0.0420] | 1.0027 |
| MARKET_RETURN$_{-1}$ | 0.0164*** | 1.0166 | 0.0169*** | 1.0171 | 0.0167*** | 1.0168 | 0.0165*** | 1.0166 |
| | [0.0049] | 1.0166 | [0.0049] | 1.0171 | [0.0049] | 1.0168 | [0.0049] | 1.0166 |
| *Time-Invariant Covariates* | | | | | | | | |
| ln(MARKET_CAP) | −0.0302 | 0.9703 | −0.0442 | 0.9568 | −0.0424 | 0.9585 | −0.0162 | 0.9840 |
| | [0.2023] | 0.9703 | [0.1990] | 0.9568 | [0.2013] | 0.9585 | [0.2030] | 0.9840 |
| MARKET_TO_BOOK | 0.2745*** | 1.3158 | 0.2567*** | 1.2927 | 0.2749*** | 1.3164 | 0.2657*** | 1.3043 |
| | [0.0753] | 1.3158 | [0.0733] | 1.2927 | [0.0750] | 1.3164 | [0.0749] | 1.3043 |
| IO | −0.0057 | 0.9944 | −0.0002 | 0.9998 | −0.0034 | 0.9966 | −0.0043 | 0.9957 |
| | [0.0140] | 0.9944 | [0.0142] | 0.9998 | [0.0141] | 0.9966 | [0.0143] | 0.9957 |
| INSIDER | −0.0258 | 0.9745 | −0.0261 | 0.9742 | −0.0277 | 0.9727 | −0.0294 | 0.9710 |
| | [0.0289] | 0.9745 | [0.0284] | 0.9742 | [0.0288] | 0.9727 | [0.0292] | 0.9710 |
| Likelihood ratio | 80.12 | | 181.67 | | 126.97 | | 148.71 | |
| Score | 83.61 | | 183.99 | | 139.13 | | 163.76 | |
| Wald | 80.61 | | 175.78 | | 131.15 | | 156.75 | |
| No. of obs. | 153,552 | | 153,552 | | 153,552 | | 153,552 | |

impact, traders may strategically time their trade executions during more liquid periods.

Another, perhaps more plausible, interpretation is that short sellers are informed traders who take a position in overvalued firms, wait until prices have adjusted to their fundamental values, and then cover their position (Boehmer and Wu (2013)). In this case, a negative position return that generates profit for short sellers would imply that the efficient price adjustment is still in progress or is complete. In contrast, a positive position return, which implies a trading loss, indicates that short sellers' information is not yet fully reflected in prices, so short sellers should delay covering. This version is more consistent with

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extant findings that informed short sellers trade to improve the informational efficiency of prices.

### C. Aggregate Market Reaction and Information in Coverings

Following Diether (2009), we use regressions to test the information content in short coverings by examining stock returns around covering trades. The dependent variables are daily adjusted returns. The key variables of interest are the four dummy variables (i.e., $D1_{-5,-1}$, $D2_0$, $D3_{1,2}$ and $D4_{3,7}$), each representing one of the windows $[-5,1]$, $[0]$, $[1,2]$, and $[3,7]$, where day 0 is the covering trade date for each short position. In models 1–5 of Table 5, the covering trade is the trade that reduces the large short position to below the reporting requirement, whereas in model 6, we focus on trades that reduce the short positions by at least 0.05% of the shares outstanding. We add a comprehensive set of controls, including the average daily turnover during the previous week, the average bid–ask spread during the previous week, the natural logarithm of the market capitalization, market-to-book ratio, institutional ownership percentage, and insider ownership percentage. We also include firm and day fixed effects to incorporate unobservable heterogeneity across firms and time, and we cluster standard errors at the firm level.[6]

The positive coefficients on the $D1_{-5,-1}$ variable in models 1–5 of Table 5 show that the stock returns are significantly positive before the cover trades. This finding is consistent with our univariate results (Table 3) that short sellers are not contrarian when covering their positions. Such positive price pressure before covering trades also suggests that adverse price pressure may force certain short sellers to cover their positions. In later analysis (Table 7), we differentiate across short sellers to disentangle the informed, unconstrained short sellers from the less-informed, constrained short sellers.

For covering trade dates, Table 5 shows results consistent with our univariate findings that returns are significantly positive, as implied by the positive significant coefficient of 0.3223 ($D2_0$) in model 1. We also find evidence of reversals for about one-third to one-fourth of the magnitude in the week after the date of the covering trade report, implied by the negative and statistically significant estimated coefficient $D4_{3,7}$. However, the net effect is still positive when we combine the coefficient estimates $D2_0$, $D3_{1,2}$, and $D4_{3,7}$ (the $p$-value is 0.0012 for the $F$-test that the sum $D2_0 + D3_{1,2} + D4_{3,7}$ is different from 0). Overall, we find strong support for Hypothesis 1 that positive returns are linked to short covering trades.

In model 2 of Table 5, we consider the economic significance of covering trades and test Easley and O'Hara's (1987) prediction that larger trades have more information as market makers infer information from the trade size and potentially make trades more costly. To test this prediction, we use the COVER_SIZE variable, which is the percentage of the total shares covered in a buy trade that reduces the size of the short position below the reporting threshold. Thus, this variable takes on the value of the covering trade size on day $D2_0$, and 0 on all

[6]Results are similar when standard errors are clustered at both the firm and day levels.

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TABLE 5

Panel Regression for the Market Reaction to Cover of Large Short Positions

In Table 5, the dependent variable is the daily adjusted returns (ADJ_RET), which is the daily returns in excess of the Tokyo Stock Price Index, the value-weighted stock index return for Tokyo Stock Exchange. In models 1–5, dummy variables $D1_{-5,-1}$, $D2_0$, $D3_{1,2}$, and $D4_{3,7}$ capture the days around the cover date and the cover date. $D2_0$ has a value of 1 on the covering trade date, and 0 otherwise. $D1_{-5,-1}$ takes on the value of 1 for the 5 days before the cover trade, and 0 otherwise. $D3_{1,2}$ takes on the value of 1 for the 2 days following the cover, and $D4_{3,7}$ takes on the value of 1 for the subsequent 5 days, and 0 otherwise. In model 6, $D1_{-5,-1}$, $D2_0$, $D3_{1,2}$, and $D4_{3,7}$ capture the days around purchases of 0.05% or more of the total shares outstanding. COVER_SIZE is the size of the covering trade as the percentage of the total shares outstanding, which takes on the value only on covering trade day, and 0 otherwise. ALL_COVER_SIZE takes on the size of the covering trade (in percentage of total shares outstanding) on the days when the short position value declines, and 0 on other days. ALL_COVER_SIZE × $D2_0$ is the interaction term between ALL_COVER_SIZE and $D2_0$ variables. $SUPPLY_{-1}$ is the shares available for shorting relative to total shares outstanding on the previous day, and $SUPPLY_{-1} \times D2_0$ is the interaction term between $D2_0$ and $SUPPLY_{-1}$. $AGGSIR_{-1}$ is the total number of shorted shares relative to shares outstanding on the previous day, and $AGGSIR_{-1} \times D2_0$ is the interaction term between $D2_0$ and $AGGSIR_{-1}$. For brevity, the firm controls (ln(MARKET_CAP), $TURNOVER_{-5,-1}$, $BA_SPREAD_{-5,-1}$, MARKET_TO_BOOK, IO, and INSIDER) are defined in Table 4. The coefficients with corresponding standard errors (in square brackets) are from panel regressions with firm and day fixed effects and clustered standard errors at the firm level. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

| | Covering Trades | | | | | Large Buys |
|---|---|---|---|---|---|---|
| Variable | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
| $D1_{-5,-1}$ | 0.0646** | 0.0639** | 0.0668*** | 0.0726*** | 0.0744*** | 0.0644*** |
| | [0.0251] | [0.0251] | [0.0252] | [0.0252] | [0.0253] | [0.0212] |
| $D2_0$ | 0.3223*** | 0.1680*** | 0.1824*** | 0.5084*** | 0.3619*** | 0.4539*** |
| | [0.0594] | [0.0578] | [0.0579] | [0.0902] | [0.0763] | [0.0645] |
| $D3_{1,2}$ | −0.0147 | −0.0149 | −0.0516 | −0.0058 | −0.0035 | −0.0510** |
| | [0.0344] | [0.0343] | [0.0360] | [0.0347] | [0.0345] | [0.0256] |
| $D4_{3,7}$ | −0.0853*** | −0.0844*** | −0.0748*** | −0.0759*** | −0.0742*** | −0.0418** |
| | [0.0204] | [0.0203] | [0.0207] | [0.0207] | [0.0207] | [0.0179] |
| COVER_SIZE | | 1.3064*** | | | | |
| | | [0.2840] | | | | |
| ALL_COVER_SIZE | | | 0.5436*** | | | |
| | | | [0.1433] | | | |
| ALL_COVER_SIZE × $D2_0$ | | | 0.7740*** | | | |
| | | | [0.2922] | | | |
| $SUPPLY_{-1} \times D2_0$ | | | | −0.0425*** | | −0.0209* |
| | | | | [0.0133] | | [0.0114] |
| $SUPPLY_{-1}$ | | | | −0.0121*** | | −0.0118*** |
| | | | | [0.0032] | | [0.0032] |
| $AGGSIR_{-1} \times D2_0$ | | | | | −0.0215 | |
| | | | | | [0.0328] | |
| $AGGSIR_{-1}$ | | | | | −0.0077 | |
| | | | | | [0.0090] | |
| ln(MARKET_CAP) | | | −0.4280*** | −0.4208*** | −0.4268*** | −0.4213*** |
| | | | [0.0322] | [0.0321] | [0.0321] | [0.0321] |
| $TURNOVER_{-5,-1}$ | | | −0.0138** | −0.0142** | −0.0131** | −0.0153** |
| | | | [0.0064] | [0.0064] | [0.0064] | [0.0064] |
| $BA_SPREAD_{-5,-1}$ | | | 0.0651*** | 0.0651*** | 0.0647*** | 0.0659*** |
| | | | [0.0179] | [0.0179] | [0.0179] | [0.0180] |
| MARKET_TO_BOOK | | | 0.0543*** | 0.0521** | 0.0534*** | 0.0514** |
| | | | [0.0204] | [0.0207] | [0.0204] | [0.0208] |
| IO | | | −0.0071*** | −0.0070*** | −0.0069*** | −0.0071*** |
| | | | [0.0019] | [0.0019] | [0.0019] | [0.0019] |
| INSIDER | | | −0.0015 | −0.0016 | −0.0014 | −0.0017 |
| | | | [0.0024] | [0.0024] | [0.0024] | [0.0024] |
| Adj. $R^2$ | 0.0321 | 0.0322 | 0.0335 | 0.0333 | 0.0332 | 0.0336 |
| No. of obs. | 410,718 | 410,718 | 410,718 | 410,718 | 410,718 | 410,718 |
| $p$-Value: D2 + D3 + D4 = 0 | 0.0012 | 0.3063 | 0.4039 | <0.0001 | 0.0010 | <0.0001 |

other days. Indeed, we find that larger cover trades are associated with greater positive returns: A large covering trade of 0.10% of total shares outstanding will result in an increase of 13.06 bps in adjusted return on the covering trade day. This

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finding is also consistent with Graph B of Figure 2, which shows that high returns are concentrated among larger covering trades.

In model 3 of Table 5, we examine short covering dynamics with the ALL_COVER_SIZE variable, which takes on the value of the short covering trades on days when the size of the reported large short positions reduces, and 0 on other days. We also include an interaction term between ALL_COVER_SIZE and $D_0$. The results from model 3 are consistent with those from model 2, indicating that on average covering trades have a positive price impact. And the positive significant coefficient estimate on the interaction term ALL_COVER_SIZE $\times$ $D_0$ suggests that the positive returns associated with covering trades are significantly larger when the short position is reduced to below the threshold. Specifically, considering a trade of 0.10% of the shares outstanding, the covering days experience an additional return impact of 7.7 bps.

In models 4 and 5 of Table 5, we interact variables related to short-selling activities ($SUPPLY_{-1}$ and $AGGSIR_{-1}$) to $D2_0$ to further analyze covering-induced returns. We find that although supply impacts the returns on the covering trade date, the aggregate shorting demand does not. Specifically, the negative and statistically significant coefficient estimate on $SUPPLY_{-1} \times D2_0$ shows that covering-induced returns are larger when the relative supply is lower, suggesting that the impact of the covering trade is larger when the stock lending market has tighter supply. This finding is related to prior literature showing that pricing efficiency is negatively correlated with supply (Saffi and Sigurdsson (2011)).

More important, the coefficients on the $D2_0$ dummy still remain positive and significant in both models, and this finding is robust when we include other control variables related to stock-specific characteristics. To complement our results on covering trades, we examine returns before and after large decreases in reported short positions (see model 6). In particular, we identify days when institutions in our sample reduce the size of their short positions by more than 0.05% of the total shares outstanding. Thus, we also capture days that institutions partially cover their short positions. Model 6 of Table 5 shows that, similar to covering dates, returns on days of large purchases are significantly positive and only partially reverse afterward.

In Table 6, we perform robustness tests of the market impact of short coverings by using i) an alternative return specification, ii) an alternative regression method (Fama–MacBeth (1973) instead of a panel regression), and iii) a sample that does not filter out the less active institutional short sellers.

In models 1 and 2 of Table 6, we replicate the main analyses from Table 5 with market-model returns. Specifically, for each month, we use daily returns in the previous 6 months to estimate beta for each stock, then calculate market-model return as the difference between stock return and the product of its beta and market return. The coefficient estimates $D_0$ in models 1 and 2 are economically and statistically similar to those reported in Table 5 (models 3 and 5) with the market excess returns. In models 3 and 4, using Fama–MacBeth (1973) regressions rather than panel regressions, we also find that our results are economically and statistically similar for returns around covering trades.

Last, we check the robustness of our results by using an extended sample that includes all reported large short positions (i.e., reported not only by active traders

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TABLE 6

Robust Regressions for the Market Reaction to Cover of Large Short Positions

In Table 6, the dependent variables are the daily market-model return in models 1 and 2 and the adjusted return in models 3–6, as defined in Table 5. Dummy variables $D1_{-5,-1}$, $D2_0$, $D3_{1,2}$, and $D4_{3,7}$ capture the days around the cover date, where the day of the cover trade is $D2_0$. $D1_{-5,-1}$ is the 5 days before the cover trade, $D3_{1,2}$ captures the 2 days following the cover trade, and $D4_{3,7}$ captures the subsequent 5 days. $SUPPLY_{-1}$ is the shares available for shorting relative to total shares outstanding on the previous day. For brevity, the firm controls (ln(MARKET_CAP), $TURNOVER_{-5,-1}$, $BA_SPREAD_{-5,-1}$, MARKET_TO_BOOK, IO, and INSIDER) are defined in Table 4. For models 1–2 and 5–6, the coefficients with corresponding standard errors (in square brackets) are from panel regressions with firm and day fixed effects and clustered standard errors at the firm level (intercepts are not reported). For models 3–4, results are from Fama–MacBeth (1973) regressions with standard errors (in square brackets) adjusted using the Newey–West (1987) estimator with 3 lags. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

| | Market-Model Returns | | Adjusted Returns Fama–MacBeth | | Adjusted Returns All Short Sellers | |
|---|---|---|---|---|---|---|
| | Cover | Large Buy | Cover | Large Buy | Cover | Large Buy |
| Variable | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
| $D1_{-5,-1}$ | 0.0734*** | 0.0650*** | 0.0670** | 0.0481** | 0.1083*** | 0.0987*** |
| | [0.0246] | [0.0208] | [0.0291] | [0.0229] | [0.0251] | [0.0206] |
| $D2_0$ | 0.3016*** | 0.3593*** | 0.2727*** | 0.2514*** | 0.3324*** | 0.3761*** |
| | [0.0586] | [0.0482] | [0.0731] | [0.0448] | [0.0544] | [0.0442] |
| $D3_{1,2}$ | −0.0023 | −0.0517** | 0.0037 | −0.0416 | 0.0092 | −0.0564** |
| | [0.0336] | [0.0252] | [0.0348] | [0.0293] | [0.0322] | [0.0252] |
| $D4_{3,7}$ | −0.0806*** | −0.0463*** | −0.0711*** | −0.0564*** | −0.0670*** | −0.0391** |
| | [0.0203] | [0.0173] | [0.0257] | [0.0207] | [0.0206] | [0.0174] |
| $SUPPLY_{-1}$ | −0.0117*** | −0.0115*** | −0.0004 | 0.0000 | −0.0131*** | −0.0128*** |
| | [0.0031] | [0.0031] | [0.0021] | [0.0021] | [0.0032] | [0.0032] |
| ln(MARKET_CAP) | −0.4012*** | −0.4016*** | −0.0154 | −0.0161 | −0.3745*** | −0.3756*** |
| | [0.0323] | [0.0323] | [0.0103] | [0.0102] | [0.0263] | [0.0263] |
| $TURNOVER_{-5,-1}$ | −0.0120* | −0.0132** | 0.0133 | 0.0122 | −0.0174*** | −0.0185*** |
| | [0.0064] | [0.0064] | [0.0157] | [0.0155] | [0.0061] | [0.0061] |
| $BA_SPREAD_{-5,-1}$ | 0.0597*** | 0.0606*** | 0.0236 | 0.0242 | 0.0700*** | 0.0711*** |
| | [0.0170] | [0.0171] | [0.0216] | [0.0217] | [0.0179] | [0.0180] |
| MARKET_TO_BOOK | 0.0522** | 0.0514** | −0.0042 | −0.0031 | −0.0033*** | −0.0034*** |
| | [0.0203] | [0.0205] | [0.0093] | [0.0093] | [0.0013] | [0.0013] |
| IO | −0.0071*** | −0.0072*** | 0.0007 | 0.0007 | −0.0071*** | −0.0072*** |
| | [0.0019] | [0.0019] | [0.0008] | [0.0007] | [0.0019] | [0.0018] |
| INSIDER | −0.0017 | −0.0017 | −0.0001 | 0.0000 | −0.0009 | −0.001 |
| | [0.0023] | [0.0023] | [0.0005] | [0.0005] | [0.0021] | [0.0022] |
| Adj. $R^2$ | 0.0311 | 0.0313 | 0.0453 | 0.0455 | 0.0334 | 0.0337 |
| No. of obs. | 410,718 | 410,718 | 410,718 | 410,718 | 425,040 | 425,040 |

but by all short sellers). The extended sample has 4,832 positions (versus 4,133 positions by active institutions in the sample used in the main analysis) by 176 institutions. As models 5 and 6 in Table 6 show, the results are again similar to those reported in Table 5 (models 3 and 5) with the active institutional sample.

## D. Heterogeneity in Short Coverings, the Role of Information, and Short-Sale Constraints

Although Tables 5 and 6 show how covering trades impact short-term stock returns, in this section we test Hypotheses 2A and 2B by examining the long-term return performance following the covering trades. If short sellers are skilled informed traders who can time the covering trades, we should not observe large stock price declines after closing. However, if short sellers initially expected to be positioned in overvalued stocks based on prior evidence but are forced to close out their positions prematurely because of internal capital constraints or other external short-sale constraints, then the stock price would continue to decline after the

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initial positive price impact, suggesting some inefficiency in closing (i.e., money left on the table by short sellers).

In Table 7, we examine the 1-, 3-, and 6-month post-covering trade returns by using a regression framework that considers informational heterogeneity among short sellers and the presence of short-sale constraints. First, in models A-1–A-3, we differentiate short positions using the aggregate shorting ratio, AGGSIR. The negative significant coefficient of −0.2969 on AGGSIR in model A-1 suggests that the stocks experience significant positive return after the covering when the aggregate SIR is low. This means that the market interprets the covering signal from individual large short sellers in conjunction with the total outstanding short positions of the group of short sellers. Thus, when the withdrawal of short sellers as a group includes our reported short covering, the market considers the disappearance of negative opinion as a strong positive signal. However, when a specific short covering is in a stock that still contains large short positions uncovered by other traders, the market's positive response is mitigated.

Next, we separate short sellers using reported return, POSCUM_RET, which is the cumulative return on the stock since the opening of the reported large short position until the covering day. In models B-2 and B-3 of Table 7, we observe negative coefficients for POSCUM_RET, indicating that returns post-covering trades are higher for more profitable shorts, which are more likely executed by more informed short sellers. Specifically, we can infer from model B-3 that stocks in which profitable large short positions (e.g., with 5% profits) were closed earn 0.65% higher returns on average over the next month than similar stocks where short sellers' positions just broke even. Taken together with results in models A-1–A-3, these findings support Hypothesis 2A and indicate that the more informed short sellers are more efficient in covering their positions.

To test Hypothesis 2B, we examine the role of short-sale constraints using internal capital constraints and securities lending market measures. Because POSCUM_RET captures short sellers' returns, it also indicates whether large losses or capital constraints cause short sellers to close their trades prematurely. (See Lamont and Stein (2004) for a detailed discussion about short sellers' capital constraints during the information technology bubble.) The negative coefficients on POSCUM_RET in models B-2 and B-3 of Table 7 suggest that losses due to price appreciation may force some short sellers to face margin calls and close their positions while the price correction is still in progress. In models C-1–C-3, we analyze the impact of short-sale constraints captured by lending fees (LENDING_FEE) because increases in lending fees make short positions more costly. With these two measures, we want to examine whether short-sale constraints play a role and cause premature covering. However, the mixed results on our constraint measures (POSCUM_RET and LENDING_FEE) imply that although short-sale constraints impact certain short sellers, at least for our sample, premature coverings are not prevalent. Thus, we do not find strong support for Hypothesis 2B.

Last, in models D-1–D-3 of Table 7, we differentiate across institutions based on institutional types. Specifically, we consider the role of brokerages and test whether these institutions, on average, are more informed than other short sellers and close out trades prior to large return run-up. We identify short sellers that

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TABLE 7

Cross-Sectional Return Regression for the Cover Trades

In Table 7, the dependent variables are the 1-, 3-, and 6-month post-covering trades cumulative adjusted returns, which are returns in excess of the Tokyo Stock Price Index (TOPIX) during the corresponding period. AGGSIR is the total number of shorted shares relative to shares outstanding on the cover day. POSCUM_RET is the raw cumulative return on the stock since the opening of the reported large short position until the cover day. LENDING_FEE is the annualized lending fee, the cost for borrowing the stock in the lending market at time of the covering. BROKERAGE dummy variable takes on the value of 1 if the short position is reported by a brokerage firm, and 0 otherwise. For brevity, the firm controls (ln(MARKET_CAP), $TURNOVER_{-5,-1}$, $BA_SPREAD_{-5,-1}$, MARKET_TO_BOOK, IO, and INSIDER) are defined in Table 4. The coefficient estimates with the corresponding standard errors (in square brackets) are obtained from panel regression with firm and day fixed effects with clustered errors at the firm level. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

| Variable | 1 Month Model A-1 | 3 Month Model A-2 | 6 Month Model A-3 | 1 Month Model B-1 | 3 Month Model B-2 | 6 Month Model B-3 | 1 Month Model C-1 | 3 Month Model C-2 | 6 Month Model C-3 | 1 Month Model D-1 | 3 Month Model D-2 | 6 Month Model D-3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AGGSIR | −0.2969** | −0.7048* | −0.8309 | | | | | | | | | |
| | [0.1512] | [0.4085] | [0.6548] | | | | | | | | | |
| POSCUM_RET | | | | 0.0023 | −0.0441* | −0.1309*** | | | | | | |
| | | | | [0.0124] | [0.0246] | [0.0381] | | | | | | |
| LENDING_FEE | | | | | | | −0.0023 | −0.0019 | 0.0005 | | | |
| | | | | | | | [0.0019] | [0.0039] | [0.0063] | | | |
| BROKERAGE | | | | | | | | | | 1.1339** | 1.9365* | 1.8634 |
| | | | | | | | | | | [0.5236] | [1.1571] | [1.4620] |
| ln(MARKET_CAP) | 0.2855 | −0.0006 | 0.0433 | 0.2041 | −0.2744 | −0.4081 | 0.1522 | −0.244 | −0.184 | 0.1707 | −0.2533 | −0.2437 |
| | [0.2905] | [0.7036] | [1.0540] | [0.2822] | [0.6743] | [1.0433] | [0.2984] | [0.6876] | [1.0262] | [0.2879] | [0.6869] | [1.0210] |
| $TURNOVER_{-5,-1}$ | −0.0869 | −0.1845 | −0.4435** | −0.0887 | −0.1803 | −0.4249** | −0.0921 | −0.1911 | −0.4467** | −0.1068 | −0.2194 | −0.4779** |
| | [0.1230] | [0.2039] | [0.2114] | [0.1233] | [0.2027] | [0.2098] | [0.1223] | [0.2023] | [0.2115] | [0.1251] | [0.2023] | [0.2148] |
| $BA_SPREAD_{-5,-1}$ | 3.0217** | 5.9604*** | 11.3253*** | 3.0299** | 5.9013** | 11.1304*** | 3.0412** | 5.9841*** | 11.3349*** | 3.0391** | 5.9932*** | 11.3592*** |
| | [1.2055] | [2.2899] | [2.8980] | [1.2029] | [2.2862] | [2.9043] | [1.2042] | [2.2969] | [2.9132] | [1.1992] | [2.2775] | [2.8890] |
| MARKET_TO_BOOK | −0.4121* | −1.1645** | −1.1278 | −0.3725* | −1.0941** | −1.0827 | −0.3650* | −1.0656** | −1.0219 | −0.3834* | −1.0898** | −1.0362 |
| | [0.2188] | [0.4918] | [0.7257] | [0.2098] | [0.4952] | [0.7653] | [0.2134] | [0.4850] | [0.7384] | [0.2120] | [0.4890] | [0.7402] |
| IO | 0.0669* | 0.1807** | 0.3831*** | 0.0546 | 0.1552* | 0.3588*** | 0.0544 | 0.1516* | 0.3493*** | 0.0545 | 0.1514* | 0.3486*** |
| | [0.0342] | [0.0871] | [0.1087] | [0.0335] | [0.0879] | [0.1190] | [0.0336] | [0.0868] | [0.1159] | [0.0331] | [0.0858] | [0.1151] |
| INSIDER | 0.0199 | 0.0673 | 0.0965 | 0.0215 | 0.072 | 0.1035 | 0.0227 | 0.0722 | 0.1007 | 0.0208 | 0.0701 | 0.0999 |
| | [0.0248] | [0.0639] | [0.0773] | [0.0249] | [0.0647] | [0.0786] | [0.0250] | [0.0640] | [0.0766] | [0.0245] | [0.0630] | [0.0760] |
| Constant | −8.2564 | −2.4578 | −8.2138 | −6.5379 | 3.7927 | 2.618 | −5.1164 | 2.9953 | −3.423 | −6.2414 | 2.1942 | −2.8023 |
| | [7.4994] | [17.0677] | [25.5899] | [7.2697] | [16.2300] | [25.4900] | [7.6850] | [16.6964] | [25.0984] | [7.3528] | [16.4143] | [24.8577] |
| Adj. $R^2$ | 0.0085 | 0.0172 | 0.0309 | 0.0075 | 0.0171 | 0.0386 | 0.0079 | 0.0153 | 0.0294 | 0.0091 | 0.0168 | 0.0302 |
| No. of obs. | 4,133 | 4,133 | 4,133 | 4,133 | 4,133 | 4,133 | 4,133 | 4,133 | 4,133 | 4,133 | 4,133 | 4,133 |

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are brokerage firms and assign a value of 1 for covering trades by those institutions, and 0 for all other trades. The significant positive coefficient estimates on BROKERAGE in models D-1 and D-2 imply that positive future returns are higher after covering by brokerage firms. This finding suggests that either highly informed short sellers use brokerages to conceal their identities or that the brokerage's proprietary trading desks, with better access to timely market information and internal research, place more efficiently timed covering trades. Data limitations prevent us from disentangling client-initiated and internal trades. Therefore, we cannot provide strong insight into the source of information.

Overall, the results from Tables 5–7 suggest that positive transient and permanent returns associated with short coverings provide important new information to the market. Our findings add valuable contributions to prior studies that focus exclusively on the opening of the shorts and therefore provide only partial views regarding the superior information of short sellers.

## V. Conclusion

Short selling requires two types of transactions: the actual short sale and the purchase of stock to cover the short sale. Although numerous studies analyze the former, we have little evidence of effects that short covering transactions have on security prices. We provide a detailed analysis of covering trades and their impact on prices by using a data set of large short positions in excess of 0.25% of the shares outstanding, which TSE rules have required to be disclosed since Nov. 11, 2008.

Although earlier work shows short sellers are contrarians when opening their positions, we find that short sellers, on average, are not contrarian traders when covering their positions. Moreover, we report a significant positive price impact around large covering trades, reflecting both transient and permanent components. We also document that short sellers who are profitable during their disclosure period also have their cover trades followed by future positive returns. Despite some indications that short sellers are forced to cover due to price appreciation, short-sale constraints in our sample do not play an important role. Thus, our findings provide strong evidence that informed short sellers use private information when closing their positions.

Overall, we offer new insights into short-sale dynamics, including the covering of large short positions. To our knowledge, we are the first to focus on short covering trades, and our analysis of the effects of these trades complements a large body of literature that shows that short sellers help incorporate negative information into prices. We show that short sellers also help to incorporate positive information into prices, and this positive price impact appears to be economically large.

Our analysis is relevant for regulators and market participants by helping them to better understand short sellers' behavior. Consistent with extant short-sale studies, we show that short sellers, as a group, are informed. Although other studies show that short sellers have timing ability when they open short positions, we go beyond the current literature to show that short sellers can also predict, or may cause, price increases around their covering decisions.

# Appendix A. Large-Short-Sale Positions over Time

In Table A1, we provide additional information on large short-sale positions. Specifically, we report the number of positions, the number of covering trades, the number of institutions, and the number of stocks for every month in our sample.

TABLE A1

Number of Large Institutional Short-Sale Positions from the Tokyo Stock Exchange

In Table A1, "No. of Positions" is the number of large outstanding short positions during the month. "No. of Covers" is the number of disclosed positions that have been covered during the month. "No. of Institutions" is the number of unique active institutions that submit reports for at least large outstanding short positions, and "No. of Stocks" is the number of unique stocks that are included in the institutions' reports during the month.

| Month | No. of Positions | No. of Covers | No. of Institutions | No. of Stocks |
|---|---|---|---|---|
| 2008-11 | 301 | 77 | 22 | 237 |
| 2008-12 | 543 | 146 | 22 | 366 |
| 2009-01 | 618 | 180 | 24 | 413 |
| 2009-02 | 806 | 203 | 25 | 539 |
| 2009-03 | 853 | 289 | 25 | 531 |
| 2009-04 | 818 | 226 | 25 | 503 |
| 2009-05 | 771 | 262 | 25 | 475 |
| 2009-06 | 713 | 242 | 25 | 437 |
| 2009-07 | 654 | 267 | 25 | 395 |
| 2009-08 | 530 | 154 | 26 | 367 |
| 2009-09 | 551 | 163 | 25 | 355 |
| 2009-10 | 573 | 233 | 27 | 355 |
| 2009-11 | 527 | 194 | 27 | 324 |
| 2009-12 | 427 | 117 | 26 | 298 |
| 2010-01 | 395 | 121 | 25 | 265 |
| 2010-02 | 385 | 175 | 25 | 259 |
| 2010-03 | 346 | 140 | 27 | 231 |
| 2010-04 | 347 | 145 | 26 | 217 |
| 2010-05 | 353 | 116 | 27 | 226 |
| 2010-06 | 402 | 182 | 27 | 253 |
| 2010-07 | 329 | 175 | 25 | 210 |
| 2010-08 | 278 | 167 | 24 | 180 |
| 2010-09 | 159 | 159 | 25 | 112 |

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## Appendix B. Institutional Short Sellers

In Table B1, we present the list of institutional short sellers whose short-sale positions are analyzed in our study. For each institutional short seller, we also show whether it is a broker and information on its positions.

TABLE B1
List of Active Institutional Short Sellers

In Table B1, "Broker" indicates whether the institution is a brokerage firm. "No. of Positions" is the total number of large short positions reported during our sample period. "No. of Stocks" is the number of unique stocks shorted and reported by the specific institution. "No. of Days" is the total number of days the specific institutions had outstanding large short positions during our sample period. "Average Duration" is the average duration in number of days for all reported large short positions. "Average Size of Position" is the average of the total shorted value across the positions in millions of yen, where the position value is the average shares shorted times the corresponding share price.

| Institution Name | Broker | No. of Positions | No. of Stocks | No. of Days | Average Duration | Average Size of Position |
|---|---|---|---|---|---|---|
| UBS Securities Japan | Yes | 20 | 9 | 231 | 21.75 | 252.97 |
| Credit Suisse Hong Kong | Yes | 21 | 14 | 383 | 45.76 | 695.34 |
| Goldman Sachs, JP | No | 23 | 22 | 422 | 64.52 | 369.96 |
| Nomura Securities, JP | Yes | 27 | 22 | 127 | 6.74 | 210.95 |
| STAR L.P. | No | 29 | 19 | 275 | 30.66 | 273.31 |
| Citigroup Securities | Yes | 30 | 13 | 230 | 26.00 | 885.76 |
| Société Générale | Yes | 32 | 19 | 149 | 8.38 | 828.55 |
| Deutsche Asset Management | No | 41 | 37 | 433 | 51.61 | 643.53 |
| Morgan Stanley & Co. Incorporated | Yes | 42 | 29 | 98 | 7.190 | 595.47 |
| Merrill Lynch | Yes | 46 | 31 | 382 | 45.46 | 1,061.68 |
| Halberdier | No | 46 | 34 | 453 | 53.98 | 371.05 |
| Morgan Stanley MUFG JP Securities | Yes | 48 | 30 | 92 | 11.06 | 244.85 |
| Bridge Multi Managers Fund | No | 55 | 43 | 446 | 39.49 | 135.65 |
| Nomura Asset Management Hong Kong | No | 56 | 52 | 147 | 56.52 | 145.64 |
| Akito Master Fund | No | 58 | 50 | 237 | 36.86 | 111.39 |
| Nomura Asset Management Singapore | No | 70 | 63 | 303 | 58.49 | 139.76 |
| Mitsubishi UFJ Securities | Yes | 84 | 38 | 396 | 16.68 | 112.49 |
| Barclays Global Investors | No | 95 | 93 | 246 | 49.85 | 318.50 |
| AQR | No | 95 | 73 | 460 | 77.42 | 651.31 |
| Barclays Capital Securities | Yes | 107 | 48 | 382 | 10.60 | 555.17 |
| Mizuho Securities, JP | Yes | 116 | 41 | 458 | 21.37 | 872.78 |
| Morgan Stanley Securities Co Ltd (Japan) | Yes | 152 | 73 | 351 | 15.53 | 341.30 |
| ART International Holdings | No | 152 | 61 | 396 | 19.73 | 190.00 |
| UBS, AG | Yes | 156 | 81 | 460 | 28.57 | 1,100.40 |
| Bridgewater | No | 158 | 123 | 459 | 90.13 | 487.39 |
| Asian Management | No | 177 | 142 | 449 | 52.29 | 286.33 |
| Goldman Sachs, US | No | 278 | 134 | 459 | 32.94 | 860.37 |
| Credit Suisse Securities | Yes | 298 | 136 | 458 | 11.614 | 472.39 |
| Deutsche, DE | Yes | 551 | 234 | 458 | 15.55 | 720.70 |
| Morgan Stanley & Co. International | Yes | 572 | 338 | 460 | 46.94 | 773.34 |
| Citigroup Global Markets Financial Products | No | 636 | 471 | 458 | 64.87 | 368.27 |

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