Short Selling

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Abstract

Short selling plays a unique role in financial markets. Short selling's institutional structure is distinct from other types of trades, and short sellers have been shown to be more informed than other types of traders. This review discusses short sellers' motivation, the institutional mechanics of short selling, the empirical findings on short selling, the regulation of short selling, the connection between corporate events and short selling, and the equity lending market. The review assesses the current direction of research as well as summarizes the current state of knowledge about the subject.

1. OVERVIEW

The academic literature has examined short selling from several different angles. Long buys and short sales are often thought of as symmetric transactions, but some aspects of short sales are unique. In particular, two aspects of short selling have received significant attention. First, short sellers profit from stock price declines and thus play an unusual role in financial markets. Second, short sellers must borrow stock, which adds institutional complexity to their transactions along with the potential for additional frictions.

Although the focus of this review is on empirical work, theoretical contributions guide much of the empirical analysis. Arguments put forward by Miller (1977); Hong & Stein (2003); Ofek & Richardson (2003); and Hong, Scheinkman & Xiong (2006) suggest that stocks will be overvalued if frictions impede short sellers. Similarly, frictions may impede the market's ability to incorporate information quickly even if investors can anticipate this overvaluation (see, e.g., Diamond & Verrecchia 1987). Duffie, Gârleanu & Pedersen (2002) model the structure of the borrowing market and show that market opacity may increase the frictions short sellers face.

A single short-sale transaction can touch varied financial institutions, and data on short selling are collected from multiple sources. The most widely used source of short-selling databases has been historically short interest, a monthly or bimonthly snapshot of open short positions at brokerages. Researchers have more recently used intradaily databases on short-sale transactions conducted on exchanges. Finally, some researchers have obtained proprietary databases from brokerages and other equity lenders. These sources catalog borrowing transaction prices and quantities.

2. SHORT SELLERS' MOTIVATION

Short sellers profit when prices decline. These returns are opposite those of long buyers, creating symmetry between long and short positions. This symmetry indicates that as many motivations for short selling exist as there are motivations for buying stock.

The literature suggests that the underlying economics of different stocks, or fundamentals, are major motivators for short selling. For example, Dechow et al. (2001) show that firms with low ratios of fundamentals (such as earnings and book values) to market values have increased short interest. Similarly, Geczy, Musto & Reed (2002) suggest that short selling can be driven by well-accepted patterns in stock prices, including the size, book-to-market, and momentum effects. Furthermore, Brent, Morse & Stice (1990) find that seasonal patterns in short selling bear a weak correlation to tax motivations. In contrast, Lamont & Stein (2004) show that short interest does not seem to relate to market-wide valuation trends.

Research has also focused on the presence of short sellers around particular corporate events. For example, Christophe, Ferri & Angel (2004) and Boehmer, Jones & Zhang (2012) find that daily flows of short sales concentrate prior to disappointing earnings announcements, analyst forecast revisions, and analyst downgrades. Karpoff & Lou (2010) find short sellers are able to trade before findings of financial misconduct. More generally, Engelberg, Reed & Ringgenberg (2012) find that short sellers trade around various negative news releases. Interestingly, Daske, Richardson & Tuna (2005) and Engelberg, Reed & Ringgenberg (2012) find no evidence of abnormal short selling prior to bad news events.

2.1. Relationship to the Options Market

The options market is closely linked to short selling for two main reasons. First, options can be used to establish positions that are economically equivalent to short sales in the stock market. Second, positions established in the options market can be hedged with those in the stock market.

Several papers have treated the presence of options as a possible substitute for short selling in the stock market; this substitution may reduce overpricing by alleviating the constraints on short selling. For example, Sorescu (2000) and Danielsen & Sorescu (2001) both associate a reduction in short-sale constraints accompanying option introduction with negative abnormal returns after 1981. This result contrasts with two studies using earlier samples: Sorescu (2000) and Conrad (1989) both associate option introduction with a price increase. Similarly, Skinner (1990) finds that the information content of firms' earnings announcements is lower after exchange-traded options are listed on their stocks.

Short selling is also used as a hedge against positions established in derivatives markets. Several papers highlight the link between options markets and short selling. Battalio & Schultz (2011); Evans et al. (2009); and Ofek, Richardson & Whitelaw (2004) show that short sellers increase their use of options when short selling in the stock market is constrained. Lamont & Thaler (2003) explore some extreme examples in which short selling in the stock market is nearly impossible, with options prices reflecting this difficulty. Chan, Kot & Ni (2012) compare negative exposure gained through open positions in the options market to negative exposure as seen in short interest from the stock market. They find that trades in the stock market are more informative than trades in the options market.

Some do not view trading in the options market as an unrelated substitute for short selling, given that stock is often used to hedge options positions. Grundy, Lim & Verwijmeren (2012) demonstrate this type of relationship using options market activity in the financial crisis. Evans et al. (2009) and Ofek, Richardson & Whitelaw (2004) demonstrate that options prices reflect short-sale constraints in the stock market. Cremers & Weinbaum (2006) find that even though short-sale constraints may drive options prices, abnormal performance following options mispricing is not solely caused by short-sale constraints.

3. THE MECHANICS OF SHORT SELLING

Short sellers sell stock they do not own. The equity lending market exists to match short sellers with stock owners who are willing to lend their shares for a fee. I describe this market in more detail below; this section outlines the basic structure of loan transactions.

3.1. The Lending Process

An investor who wants to sell a stock short must generally find a party willing to lend those shares. Most exchange procedures require that the short seller deliver shares to the buyer on the third day after the transaction ($t + 3$). The proceeds from the short sale are deposited with the lender of the stock. For US stocks, the lender generally requires 102% of the loan's value in collateral. The value of the loan is marked to market daily; an increase in the stock price will result in the lender requiring additional collateral for the loan, and a decrease in the stock price will result in the lender returning some of the collateral to the borrower. All collateral returns to the borrower upon the return of shares to the lender. The process of delivery and payment is typically called settlement or clearing.

While a stock is on loan, the lender invests and receives interest on the collateral. Part of this earned interest returns to the borrower in the form of a negotiated rebate rate. Rather than fees, the primary cost to the borrower is the difference between the current market interest rate and the rebate rate received from the lender. The lender benefits from participating in this market through the ability to earn the spread between those rates. Such interest can add return to a lender's portfolio even though the earnings from this interest spread are often split between several parties participating in the lending process.

3.2. The Drivers of Rebate Rates

The rebate rate, or the rate paid to the borrower on cash collateral supplied, effectively determines the price of a stock loan. This rate is determined by supply and demand in the market for borrowing stock. For highly liquid stocks widely held by institutional lenders, the borrower can expect to earn the full rebate, or general collateral rate, on the collateral. This rate is generally 5–25 bps below the federal funds rate for each day. The spread generally increases to ~35 bps when the equity lending market has less available supply, as with middle-capitalization stocks.

The majority of loans in the equity lending market are made in widely held stocks that are cheap to borrow, but several expensive loans known as stock specials also occur. Rebate rates may be reduced on less widely held securities or securities with a large borrowing demand. In that case, the securities are said to be trading special, or just special. The rebate rate is negotiated on a case-by-case basis in these transactions, and the rate earned by the borrower's collateral is below the general collateral rate paid on easily available securities.

Only a few stocks are on special each day; a one-year sample showed approximately 7% of its securities on special. The specials are not necessarily limited to small stocks; 2.77% of large stocks were on special during the same time period. In rare cases, when a stock is in high demand, the rebate rate can be significantly negative.

Specials are identified by their low rebate rates, and thus increased borrowing costs, but they present additional difficulties to borrowers. Only well-placed investors, e.g., large proprietary trading desks, can borrow specials and receive the reduced rebate. Brokers generally do not borrow special shares on behalf of small investors and instead deny short-sale orders. Loans in stock specials are therefore expensive for well-placed investors and impossible to obtain for retail investors.

Borrowing occurs in myriad institutional settings, but one of the most prominent is the wholesale-level equity lending market. This market is highly fragmented and opaque, making careful analysis difficult. Nonetheless, several papers have obtained data and drawn insights from the equity lending market. The market overview by D'Avolio (2002) shows that most stocks have an excess supply of lendable shares. However, the paper shows that stocks with low institutional ownership and stocks with low market capitalization are more likely to be difficult or expensive to borrow. Geczy, Musto & Reed (2002) show that short-sale constraints might not significantly impact the overall profitability of trading strategies based on stock characteristics. Cohen, Diether & Malloy (2007) and Jones & Lamont (2002) show that future returns are lower when stocks are difficult to borrow, indicating that overpricing increases when short-sale constraints are binding.

Kolasinski, Reed & Ringgenberg (2013) explore the relationship between market structure and rebate rates, using a database that allows them to analyze multiple lenders' prices for a given security. They find that the fragmented nature of the lending market induces borrowers to search for hard-to-borrow stocks. Among their main findings is the unequal response of rebate rates to different changes in borrowing demand. In particular, rebate rates are sensitive to demand only when the demand levels are unusually high, given that most stocks are in ample supply. The paper confirms some of the standard predictions of search models, such as the existence of price dispersion and its concentration in hard-to-borrow stocks.

Several papers have considered the choice to lend from the perspective of the mutual fund manager. Kaplan, Moskowitz & Sensoy (2013) study an experiment in which one lender adds supply by lending shares in the market for the first time and finds no effect on returns. Prado (2012) finds that lenders' income is effectively capitalized into current security prices. Evans, Ferreira & Prado (2013) find that lending revenue is traded off against negative information in the fund manager's decision to lend. Chuprinin & Massa (2013) use fund managers' decisions to lend to

identify the relationship between short-sale constraints and future returns, and they find that constrained stocks have significantly negative returns. This finding confirms the predictions of the framework of Blocher, Reed & Van Wesep (2013).

3.3. Failing to Deliver

Settlement is connected to stock market transactions but does not always mirror the initial transactions perfectly. In some cases, short selling may take place without borrowing. In these cases, also known as naked short selling, the short sale may result in a delivery failure in which the buyer fails to receive shares and the lender may fail to deliver those shares. Despite regulatory scrutiny of the issue, the academic community has paid limited attention to the issue. Boni (2006) shows that most issues have at least a few delivery failures and that such failures are common. Furthermore, a significant fraction of issues have persistent delivery failures. Evans et al. (2009) show that failure to deliver is closely linked to borrowing costs; delivery failures are rare when borrowing costs are above zero, as measured by rebate rates. Furthermore, no delivery occurred for one large trader if rebates rates fell below zero. Fotak, Raman & Yadav (2009) show that naked short selling may have positive effects by easing liquidity provision.

Delivery failure has received significant regulatory attention. The US Securities and Exchange Commission (SEC) implemented Rule 204T in 2008 to address persistent failures to deliver; the rule became permanent in 2009. Kolasinski, Reed & Thornock (2013) show that the rule was effective in reducing the incidence of failure to deliver.

4. EMPIRICAL FINDINGS ON SUCCESS OF SHORT SELLERS

Many early studies ask whether short interest is a bullish signal, because short sellers must eventually buy shares, or a bearish signal, because short interest correlates with negative private information. Empirical studies attempt to answer this question by examining the relationship between measures of short selling and future returns. The two main measures of short selling are short interest, measured monthly or bimonthly, and short-sales volume, measured at an intraday frequency.

4.1. Returns and Monthly Short Interest–Based Measures of Short Selling

One of the earliest articles to empirically examine short sales, Seneca (1967), uses market-wide short interest to predict future market returns. The paper finds that high short interest leads to lower returns for the S&P 500. Similarly, Figlewski (1981) sorts stocks into portfolios based on short interest and finds that short interest is negatively correlated with future excess returns. Further contributing to the evidence that short interest is a bearish signal, Asquith, Pathak & Ritter (2005) form a portfolio of stocks yielding high short interest and find that this portfolio underperforms the market. Desai et al. (2002) find similar results for the Nasdaq market. Many papers confirm this result in different contexts (see, e.g., Boehme, Danielsen & Sorescu 2006; Chen & Singal 2003; and Pan & Poteshman 2006 in the options context). A recent paper by Boehmer, Huszar & Jordan (2010) provides a complete, updated view of the relationship and shows that the strength of the short interest signal is concentrated among stocks with an extreme lack of short interest. The same data can provide a slightly different perspective when one studies the short-run announcement effects after the public release of short interest reports. Senchack & Starks (1993) find short-term negative abnormal returns after announcements of higher-than-expected short interest. Huszar & Qian (2012) argue that the profitability findings are likely overestimated because they do not include lending fees. Similarly, Arnold et al. (2005); Nagel (2005); and Duan, Hu & McClean (2009) argue that abnormal performance is concentrated among constrained stocks.

4.2. Relationship to Dispersion of Beliefs

Research shows an association between short interest and negative returns, but intuition suggests that this relationship stems from disagreement among investors. Many investors with negative views do not short sell. In other words, if beliefs disperse, optimists will have long positions and some pessimists will have short positions, but other pessimists will not short sell. Therefore, if opinions disperse and if short selling is constrained, prices will be biased upwards in the short run. As opinion coalesces, prices will decline.

Several studies have worked to empirically document these effects. For example, Asquith, Pathak & Ritter (2005) show that short-sale constraints lead to low subsequent returns, and Ofek & Richardson (2003) argue that short-sale constraints can partially explain the Internet bubble. Diether, Malloy & Scherbina (2002) and Chen, Hong & Stein (2002) show that dispersion in beliefs leads to low subsequent returns. Scherbina (2008) shows that negative information suppressed by analysts is not quickly incorporated into stock prices. Similarly, Boehme, Danielsen & Sorescu (2006) show that when short selling is constrained and opinions are relatively divergent, abnormally high short interest can precede negative future returns. In contrast, Doukas, Kim & Pantzalis (2006) find that a diversity measure of analyst disagreement has the opposite effect.

4.3. Returns and High-Frequency Measures of Short Selling

In addition to analyzing the relationship between returns and monthly short interest, several studies have benefited from the recent increased availability of higher frequency short-sales data. For example, Boehmer, Jones & Zhang (2008) find that heavily shorted stocks, especially those heavily shorted by nonprogram institutional traders, significantly underperform lightly shorted stocks. Diether, Lee & Werner (2008) show a bidirectional influence in that prices follow short selling and short selling follows prices; that is, short sellers tend to short after price run-ups. Similarly, Aitken et al. (1998) show that price declines follow short sales within 15 min on the Australian Stock Exchange. In summary, the above work establishes that short sellers are informed traders in the sense that their trades are generally followed by negative returns. Furthermore, this effect is strongest when beliefs are dispersed and when short selling is constrained.

4.4. Relationship to Other Anomalies

In addition to the papers mentioned above, which consider how measures of short selling drive future returns in their own right, short-sale constraints have also been thought of as an important aspect of other anomalies. In particular, several papers have identified the presence of short-sale constraints as a possible contributing factor in the asymmetry of long and short legs of well-known anomalies generally, such as Israel & Moskowitz (2012) and Stambaugh, Yu & Yuan (2012b), and in specific anomalies such as momentum (Jegadeesh & Titman 1993 and Hong, Lim & Stein 2000), accruals (Hirshleifer, Teoh & Yu 2011), and idiosyncratic risk (Stambaugh, Yu & Yuan 2012a).

5. REGULATORY CHANGES

5.1. Regulation SHO

Short selling has been the focus of several recent regulatory changes. One of the longest running restrictions on short selling, the price test (or uptick rule), was lifted starting in 2005 with the SEC's Regulation SHO pilot program. Several papers analyzed the pilot, which had been designed to facilitate academic study. Although Diether, Lee & Werner (2009) find relatively few effects of the

rule, they find evidence of smaller trades without a change in total volume. The paper also shows that bid and ask depth were more symmetric after the rule change. The SEC (2007) largely confirms the findings in the academic literature and finds no evidence of abusive short selling after the change. Overall, many measures of market quality improved after the rule change.

5.2. Short-Selling Regulation Changes Surrounding the Financial Crisis

Several studies have recently analyzed the effects of the changes in short-selling regulation surrounding the financial crisis. Focusing on the ban of September 2008, Boehmer, Jones & Zhang (2013) find that the ban was associated with a significant share price increase for affected stocks. They further find that stocks subject to the ban had lower market quality as measured by spreads, price impact, and intraday volatility. Jain et al. (2013) and Beber & Pagano (2013) examine shorting bans across multiple countries and find significant declines in borrowing and market quality in the countries that enacted a full or partial ban on short selling. Another set of papers examines the effects of the equity shorting bans on the options market. Battalio & Schultz (2011) find evidence that option volume for affected stocks remained largely unchanged during the ban, but the cost of synthetically shorting banned stocks increased significantly.

5.3. Return of the Uptick Rule

The SEC reversed course in 2010 by promulgating a new uptick rule. In Rule 201, the SEC required stocks whose prices fall by 10% or more on one day to be then subject to the requirement that if a short sale is to be effected, the previous trade must not have moved prices downward. Jain, Jain & McInish (2012) find that the 10% trigger would affect approximately 70 stocks per day.

5.4. International

A wide range of international rules restrict short sales and equity lending. Several papers use these rules, and changes made to them, to investigate the effect of short sales on overall market efficiency. Bris, Goetzmann & Zhu (2007) construct measures of price efficacy and relate them to the ability to practice short sales in 46 countries. They find that markets practicing short selling generally have higher levels of price efficiency. Similarly, Saffi & Sigurdsson (2011) show that higher short-sale constraints, as measured by lending supply, have lower price efficiency across 26 countries. Daouk & Charoenrook (2005) gather evidence on short-sale restrictions in 111 countries and show that when short selling is possible, returns are less volatile and there is greater liquidity. Similarly, Chang, Cheng & Yu (2007) use a sample from Hong Kong to show that stocks in which short selling is allowed have greater liquidity and price efficiency.

In their examination of Australian rules requiring immediate disclosure, Aitken et al. (1998) show that disclosure of short positions has an immediate negative effect. Jones, Reed & Waller (2012) study a new regime under which large short positions must be disclosed the day after the trade. In this regulation, which affects several European markets, short sellers must disclose their identity publicly. The authors find large, but marginally statistically significant price effects after disclosures and also evidence that large positions tend to be followed by other large positions. This piling on echoes the theoretical prediction of Goldstein & Guembel (2008).

6. INTERACTION WITH CORPORATE EVENTS

Short selling occurs for various reasons, but the academic literature has identified a few specific situations in which short selling is particularly prevalent. Safieddine & Wilhelm (1996) and Corwin (2003) investigate rule changes in the United States designed to curtail manipulative short

selling around SEOs. Similarly, Henry & Koski (2010) examine daily US short-selling data around SEO pricing dates. Edwards & Hanley (2010) show that short selling is prevalent around initial public offerings (IPOs), especially underpriced issues. Mitchell, Pulvino & Stafford (2002) describe short selling around mergers, and Geczy, Musto & Reed (2002) show that short-sale constraints can significantly impact merger arbitrage trading strategies.

Two situations exist in which the mechanics of short selling can have significant economic consequences. Because the vote cannot be easily replicated by the short seller, equity lending can be used to transfer voting power. Christoffersen et al. (2007) and Aggarwal, Saffi & Sturgess (2012) find mixed evidence of whether equity loans are used to transfer voting power. Similarly, dividends can be reimbursed by short sellers but the substitute dividend may have different tax consequences than the original dividend. This idea is explored in the United States by Thornock (2013) and internationally by Christoffersen et al. (2005).

In the equity loan market, specials tend to be driven by episodic corporate events that increase the demand for stock loans or reduce the supply of stocks available for loan. Such events can include IPOs, dividend reinvestment discount programs, and dividend payments of foreign companies. Shares available in the first settlement days of an IPO are generally on special. At issuance, the average IPO's rebate rate is 3% below the general collateral rate, but this spread from the general collateral rate falls to 1.5% within the first 25 trading days.

Similarly, the short selling of merger acquirers' stock drives specialness. Loans of merger acquirers' stock have rebate rates 0.23% below general collateral rates. Additionally, brokers prohibit their clients from buying stocks with prices below $5 on margin, which can leave a limited supply of these low-price shares available for loan from broker-dealers. Factors that can improve a stock's liquidity and therefore its rebate rate include a secondary issue of the security, an expiration of an IPO lock-up period, and the reduction in short-selling demand as a result of the completion of a merger or corporate action.

7. THE EQUITY LENDING MARKET

The equity lending market's size emphasizes its importance; according to Data Explorers, the market size is $11 trillion, of which $2 trillion is out on loan at any given time. Furthermore, the market has grown rapidly. From 1985 to 1999, the total value of assets available for borrowing has increased from $250 billion in 1985 to approximately $3.8 trillion in 1999.

Despite its obvious importance to the operation of financial markets, the equity lending market is arcane. Loans are often negotiated over the phone between borrowers and lenders. Significant improvements have been made in recent years, but no widely used electronic quote or trade network in the equity lending market exists.

Several changes have occurred in recent years. First, market-wide data are now available to institutional market participants. These participants must be willing to provide data on their own transactions and pay to view market-wide averages. Furthermore, an effort is underway to introduce an electronic auction market to replace the over-the-counter nature of negotiation for stock specials.

7.1. Market Participants

7.1.1. Lenders. The largest equity lenders have traditionally been custodian banks that clear and hold positions for large institutional investors. Custodian banks can act as lending agents, charged by beneficial owners with lending those owners' shares to borrowers. The custodian bank and the beneficial owners use a prearranged fee sharing agreement to divide any revenue generated by

securities lending. A typical arrangement would have 75% of the revenue going to the beneficial owner and 25% going to the agent bank. Depending on the type of assets being lent and the borrowing demand, the lending revenue earned by the owner of the security may completely offset custodial and clearance fees for institutional investors.

Additional third-party agent lenders participate in the equity lending market. Under this structure, an agent firm lends assets but is not their custodian. Instead, the agent facilitates settlement by working with a traditional custodian bank once a loan is negotiated. In comparison with custodian banks, these noncustodial lenders often offer advantages to the beneficial owner such as more specialized reporting, flexibility, and more lending revenue.

Beneficial owners may decide to lend their assets directly to borrowers rather than through agency lending arrangements. Through an exclusive arrangement, the owner commits its assets to one particular borrower for a specific duration. For example, the California Public Employees Retirement System has lent its portfolios through an auction system with the winning bidder gaining access to the portfolio for a predetermined length of time. This arrangement guarantees a return to the beneficial owner for future asset loans.

Some institutions maintain their own internal lending departments and manage direct loans to multiple borrowers. This step gives them total control over the lending process and affords them more of the revenues generated. Only the largest institutional investors can choose this option due to the large costs involved in setting up a lending department and the infrastructure needed.

7.1.2. Lenders' rights. Once a loan is transacted, the stock owner retains what is known as beneficial ownership of the shares. This status gives the owner the right to receive the value of any dividends or distributions paid by the company while the stock is on loan. However, the borrower rather than the company pays the dividend and distributions in what is referred to as a substitute payment.

The owner is also entitled to participate in any corporate actions that occur while the security is on loan. For example, if the beneficial owner wishes to participate in a tender offer, a borrower unable to return the security prior to the offer's completion must pay the beneficial owner the tender price. The only right the lender surrenders when lending assets is the right to vote on a security. However, the lender generally has the right to recall the loaned security from the borrower for any reason, including recalling shares to vote.

In the event of a recall, the borrower must return the shares to the lender within the normal settlement cycle. For example, if the beneficial owner sells a security that is on loan, the agent lender will send a recall notice to the borrower on the first business day after the trade date ($T + 1$) instructing the borrower to return the shares to the agent within two business days ($T + 3$). If the shares are returned within this period, the custodian can settle the pending trade. If the borrower fails to return the security by the recall due date ($T + 3$), the agent may buy shares to cover the position, therefore closing out the loan.

7.1.3. Lenders' risks. The beneficial owner faces three types of risk when lending stock: investment risk, counterparty risk, and operational risk. Investment risk involves the choices that the beneficial owner or its agent makes when investing collateral. Some lenders are reluctant to take risks when reinvesting collateral and invest primarily in overnight repurchase agreements or other very low risk investments. Other lenders seek extra income and invest in higher-risk assets. For example, pursuing longer-term investments and short-term corporate debt with lower credit ratings can yield greater return. The beneficial owner is responsible for managing these risks and must monitor the investment of the collateral.

During the financial crisis, this investment risk was highlighted. In several cases, agent lenders and beneficial owners faced losses and/or unexpected restrictions because agent lenders invested in illiquid assets that could not be easily sold when beneficial owners chose to curtail lending or when borrowers chose to curtail borrowing. This issue was particularly prominent among agent lenders investing in mortgage-backed securities, which in some cases had high credit ratings.

Counterparty risk is the risk that the borrower fails to provide additional collateral or fails to return the security. The beneficial owner can manage this risk by approving only the most creditworthy borrowers and by imposing credit limits on those borrowers. Collateral is marked to market daily, allowing lenders to buy shares to cover the loan if the borrower does not return the shares.

Operational risk is the risk that various responsibilities of the agent lender or borrower are not met. These oversights could include the failure to collect dividend payments; failure to instruct clients on corporate actions, resulting in missed profit opportunities; failure to mark a loan to market; and failure to return a security in the event of a recall. Maintaining a good lending system that tracks dividends, corporate actions, and the collateralization of loans can minimize these risks.

7.1.4. Borrowers. The largest borrowers of stocks are prime brokerage firms facilitating the short demand for their own proprietary trading desks, for their hedge fund clients and other leveraged investors. Trading desks often borrow stock to enable long-short trading strategies. The hedge fund industry's tremendous growth during the past decade has led to the increased use of sophisticated strategies that require borrowing stock. Hedge funds have traditionally used prime brokers to gain access to the lending markets because lending firms are reluctant to approve hedge funds as creditworthy borrowers.

The borrower faces two types of risk: the risk of a loan recall and the risk of a decrease in rebate rates. Recall risk is the risk of the stock being recalled by the lender before the borrower is prepared to close out its position; in one sample this recall occurs in approximately 2% of the loans. Borrowers prefer loans that last for the duration of the short position, but guaranteed-term loans are rare. Borrowers can therefore manage recall risk by working with a lender willing to loan the stock for an extended period of time. Often the most stable sources of stock loans are portfolios with little turnover, such as index funds.

No rules govern which loans will be recalled if a beneficial owner recalls a stock loan. If the agent for the lender has loaned the stock to several different prime brokers and some of those shares need to be returned, the lending agent has discretion in deciding which prime brokers' loans to recall. Moreover, if the prime broker has allocated these shares to several different borrowers, the broker can select which borrowers will have their shares recalled. If the borrower's loan is recalled by the lender, it is the borrower's responsibility to return shares to the lender by either buying shares in the market or borrowing the shares from another lender. If the borrower fails to return the shares, the lender can institute a buy-in, using the borrower's collateral to buy shares to cover the loan. In other words, recalls can force borrowers to unwind their trading strategies suboptimally or can expose the borrowers to potentially poor execution in the case of a buy-in. A borrower's challenge is to find a lender that best balances these risks.

8. CONCLUSION

Short selling has received a tremendous amount of attention by both academics and regulators, especially in the past 10 years. As research has explored an increasing number of aspects of this type of trade, the idea that short-sale constraints lead to less efficient pricing has been established. Because institutional improvements have the potential to reduce these constraints, the institutional framework around short selling has emerged as a possible area for regulatory scrutiny.

From an academic perspective, one of the most robust findings of the literature is the fact that short sellers are generally informed traders, meaning short sales predict negative future returns. Despite the fact that this general result has been shown in several distinct contexts, researchers know very little about why these traders appear to be informed. Future research is likely to dig deeper into the question.

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