STATE STREET

To Lend or Not to Lend?

An academic review of securities lending's impact on asset prices and fund performance

Introduction

To lend securities for additional revenue or not to lend out of concern of short-selling? The decision to participate in securities lending programs has been debated since the first institutional investors started lending securities in the early 1970s to generate additional returns on their holdings.

The debate often focuses on securities lending's potentially negative impact on stock prices through the facilitation of short selling. Specifically, beneficial owners question the impact that the ultimate borrowers of securities, who may be selling short the stock, have on market functionality and the value of the stocks on loan. Whether securities lending is detrimental to markets and fund performance has been a longstanding discussion in many corners of the financial world. This has attracted the interest of financial researchers, who look to address this through empirical evidence.

In this paper, our objective is to summarize a number of relevant key papers, findings and quantitative approaches across academic literature to address the question – is securities lending detrimental to asset prices and market functionality, thus leading to portfolio underperformance? We analyze over 20 studies that are wide-ranging in their methodologies and highly relevant to understanding securities lending's impact on fund performance and market functionality. These studies are primarily sourced from highly regarded peer-reviewed journals, such as the Journal of Finance. They use rigorous quantitative approaches, as well as differentiated datasets over multiple time periods and market regimes to address this area of research, adding to the robustness of our approach.

At first glance, the relationship between securities lending and asset prices may seem unclear. For example, a large body of research shows that high levels of utilization (shorting demand relative to lending supply) predict negative returns. This suggests that securities lending leads to price declines. However,

a closer look at empirical evidence suggests that while shorting demand is an important bearish signal and may predict negative future stock returns, lending supply is not the cause of stock price declines. In fact, evidence suggests that supply-constrained stocks tend to underperform those with higher levels of supply on a forward-looking basis. Regarding fund performance, there are important nuances between passively and actively managed funds, but the weight of empirical evidence finds that securities lending improves fund performance by contributing to net investment income and reducing tracking error without detracting from share value. As it relates to short selling's impact on capital markets, academic findings suggest that short selling improves market efficiency and provides liquidity, particularly when it is needed most.

In this paper, we first discuss the importance of breaking out short selling demand from securities lending supply. We then examine the effect of securities lending supply on asset prices and fund performance. We further review findings from papers studying short selling's impact on capital markets.

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Breaking out short selling demand from securities lending supply

The securities lending market is an interesting but challenging market to study. As in most econometric problems, supply and demand are closely interconnected, thus the fees paid to short a stock are endogenously determined by the equilibrium of these two variables. Once more, supply can affect the level of short-selling demand and short selling demand can affect the level of lending supply. For example, if the lending supply for a given security is considerably low, the fees can be pushed higher, and arbitrage strategies would need higher expected negative returns to offset the increasing price to borrow the share, i.e., fees may outweigh alpha. This can push shorting demand to a level lower than it would be if fees were not as high. This is referred to as a "short sale constraint". This endogeneity of supply and demand is why it is critical to isolate the effect of short-selling demand from lending supply when studying the impact of securities lending on stock prices. Let us start with borrowing demand, a proxy for short selling.

Short selling demand a bearish signal?

Financial theory suggests that short sellers are informed. **Diamond and Verrecchia (1987)** argue that given the costs associated with short selling, e.g., lending fees, recall risks and dividends, investors that engage in shorting are likely to be informed traders. A multitude of research provides empirical evidence supporting this. **D'Avolio (2002), Boehmer et al (2008), Christophe, Ferri, and Hsieh (2010), and Boehmer et al (2020)**, to name a few, find evidence that short sellers actually anticipate earnings surprises, financial misconducts and analyst downgrades.

While it is clear that short selling should be viewed as a bearish signal, the main purpose of this paper is to examine the effect lending supply has on asset value. The research focusing on lending supply is relatively new, but there are a number of published studies that we can pull insights from. We discuss these findings in the next section.

Earnings surprises

Financial misconduct

Analyst's downgrades

The effect of securities lending supply on stock prices and fund performance

Institutional investors considering securities lending are often concerned over the negative impact it may have on the value of their positions. After all, why would a shareholder want to facilitate short sellers if they believe that short selling is counterproductive to long-term creation of value? To test the validity of this concern, financial researchers have used several quantitative methods in their approach.

Kaplan, Moskowitz and Sensoy's (2013) paper in the *Journal of Finance* addressed this question head-on. They worked with a large (anonymous) money manager to perform a live experiment in which stocks are randomly made available or not available for lending. They artificially induced a large enough supply shock to significantly reduce loan fees and increase quantities on loan for stocks (mainly mid- and small-market cap) but found no detectable adverse effects on security prices. In other words, the supply withheld and later released in the study resulted in significant changes in loan fees but had a negligible effect on security prices.

The simultaneous, controlled and randomized experiments were conducted during an extremely uncertain and volatile period during 2008, and an independent longer period in 2009 when markets had stabilized. This, combined with the fact that they focused the experiment on high loan fee stocks, which are more likely to observe a negative impact on prices, add a level of robustness to their findings.

Prior to their study, **Cohen et al. (2007)**, also published in the *Journal of Finance*, took a very different approach to reach a similar conclusion. Although not a perfect approach, they use borrowing fees and amount on loan to isolate securities lending supply from shorting demand. They found no price responses associated with shifts in lending supply while finding a significant price response associated with increasing demand, as discussed in the previous section.

Other market-wide studies have determined nuanced relationships between lending supply and future returns of short-constrained stocks, i.e., "special" or "Hard-to-Borrow". **Nagel (2005)**, published in the *Journal of Financial Economics*, was among the first to show that a lack of lending supply may cause certain "special" stocks to be overvalued because they are hard to short. This led to disappointing future quarterly returns for those stocks during their sample period from 1980 to 2003. However, these results were based on institutional ownership as a proxy for securities lending supply rather than a direct measure.

More recently, **Beneish, Lee and Nichols (2015)**, published in the *Journal of Accounting and Economics*, used the expansive securities lending dataset of IHS Markit® to explicitly measure supply, borrowing fees, and demand. They corroborate the findings of **Nagel (2005)** and make an important contribution. Among special stocks, those with the lowest supply have the strongest negative future returns when

controlling for shorting demand, i.e., specials with higher supply outperform those with lower supply. Their study of the United States equity market from 2004 to 2014 also finds that a significant portion of stocks with low shorting demand can still go special due to a lack of lending supply. In other words, even though these stocks have little shorting demand, their fees are pushed higher due to low lending supply, e.g., only around five percent to 12 percent of market cap is available to lend. These special stocks observe economically and statistically significant one-month negative future returns of -0.9 percent and -1.5 percent; consistent with the notion that low supply leads to overvaluation, thus negative expected returns, as suggested by **Miller (1977)**.

Indeed, **Chuprinin and Massa (2013)**, a working paper, reinforces this point by finding a positive relationship between lending supply and future one-, three- and six-month returns within the US equity market from 2003 to 2010. An increase in securities lending supply by one standard deviation, i.e., making it easier to short the stock, increases next month's market-adjusted stock return by 0.22 percent.

Published in the *Journal of Financial Markets*, **Blocher and Zhang (2016)**, reveal an interesting puzzle. They find that the marginal buyer of special stocks lend less. This is counter intuitive – we understand short-constrained stocks have negative expected returns, so why do new buyers not capture the high lending fees? The authors find that these buyers may choose strategic non-lending in an attempt to inflate short-term prices in high disagreement situations, i.e., earnings, resulting in 16 basis points (bps) over 20 days (the study only identified successful events). The authors note that these investors likely have very short-term horizons (less than one month) and that "buying and not lending is a poor trade in the long run".

Adding to this line of thought, **Palia and Sokolinski (2019)** find that the rise of passive investing expands the lendable supply of stocks, and stocks with more passive ownership (a combination of index mutual funds and ETFs) show faster price discovery, thereby reducing the likelihood of large negative returns for special stocks, as shown in Figure 2. Given a set level of real profitability and cash flow for a company, it may be in a long-term owner's best interest for that company to be fairly valued, because overvaluation erodes the percentage return of its profits as a ratio of total capital invested.[1]

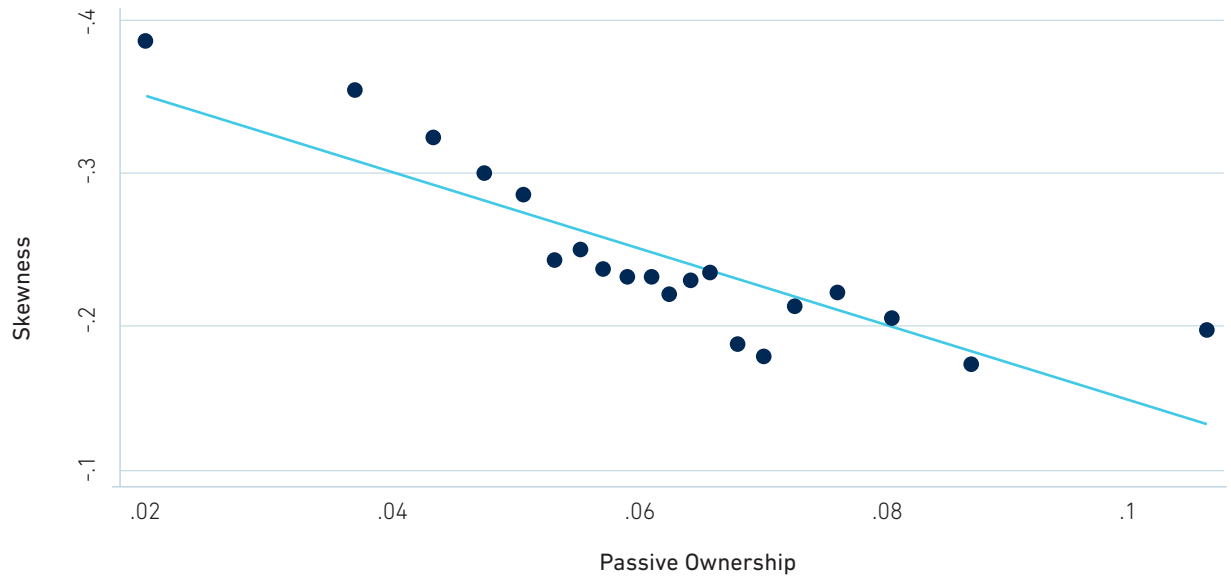
Viewed holistically, the evidence presented thus far suggests that while low securities lending supply may inflate prices in the short term when short-sale constraints are binding and there is a high degree of disagreement, the prices are destined to correct, leading to negative future returns. Thus, it usually makes sense to lend general collateral (GC) and special[2] securities in the long run. At this point, we now turn from the impact of securities lending on asset prices, to its impact on fund performance.

Published in the *Review of Finance*, **Evans, Ferreira and Prado (2017)** study of 2,070 US funds from 1996 to 2008 reveal that actively managed funds may be better off selling special stocks with high borrowing

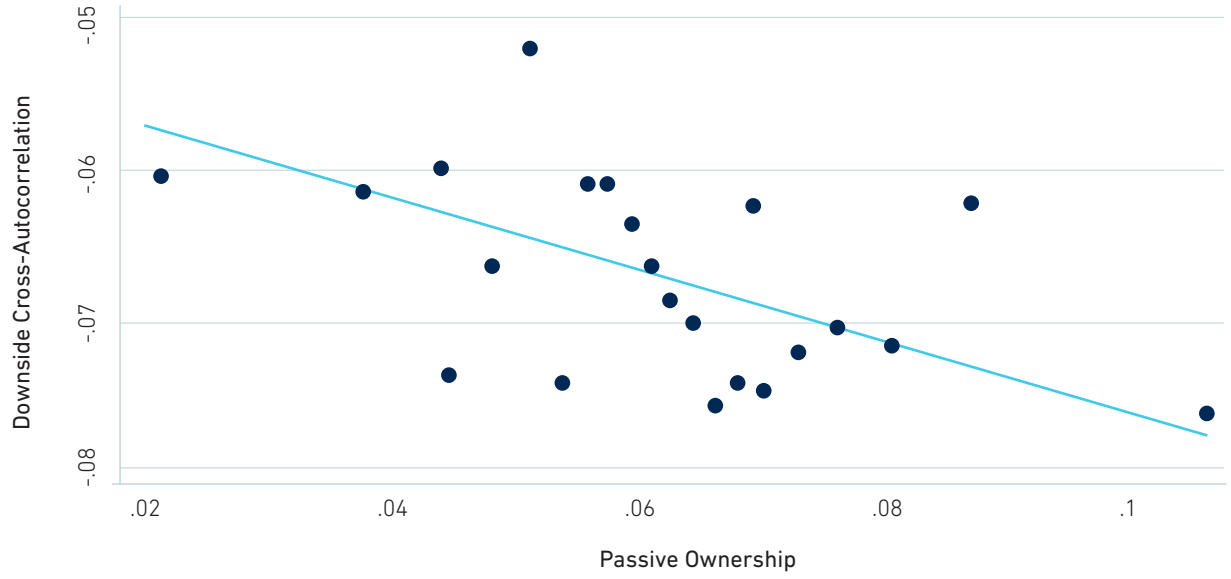
[1] Empirical evidence suggests that increases in equity lending supply also increases the efficiency of corporate investment, see **Tsai, Wu, and Xu (2021)** published in the Journal of Corporate Finance.

[2] It is important to note that special stocks tend to be biased toward small-caps with low institutional ownership, meaning they likely make up a smaller weight of an investor's overall portfolio.

Figure 2: Passive ownership increases lending supply, which improves price discovery and reduces downside risk



Source: Palia and Sokolinski (2019)



Increased passive ownership reduces future negative downside risk and skewness of special stocks by reducing short sale constraints (i.e., increasing securities lending supply).

demand rather than lending them because shorting demand is a bearish signal. However, many cannot sell because they are constrained by investment mandates. This constraint was shown to originate from larger fund families who seek to diversify individual fund managers across different investment objectives, e.g., restrict an individual fund from selling stocks of a certain style to maximize family assets under management. Simply put, active funds that cannot freely sell a stock with a bearish signal due to investment restrictions should lend those stocks to partially recuperate any losses. For unrestricted funds, i.e., no constraints on selling positions, they find the funds that lend outperform those that do not. These findings are consistent with the empirical results presented previously in that increases in lending supply is not detrimental to stock prices.

Dunham and Simpson (2012) and **Dunham and Simpson (2015)** report in the *Journal of Wealth Management* that securities lending over the preceding six years provided additional income resulting in higher fund returns for US equity index funds and ETFs, respectively. The impact was largest for small-cap indices. These findings suggest that lending was a net positive contributor to the performance of passive investments during multiple market regimes, including 2007 and 2008, as observed in Figure 3.

In summary, empirical evidence taken as a whole suggests that securities lending is not a question of if but when. Passive funds can enhance their tracking error and performance through securities lending. Active funds can lend GC and specials to earn additional revenue relative to their peers and are particularly useful in recuperating potential losses on bearish positions they are unable to sell out of, due to family-wide fund investment restrictions. On certain high disagreement events, such as earning announcements and news events, funds may consider strategic non-lending if they have a very short-term investment horizon for a special stock and plan to liquidate their positions shortly after. Upcoming proxy votes will also affect the decision to lend – lenders may want to consider recalling securities to participate in upcoming votes that are material to the firm's financial or sustainability performance. The materiality of the vote should be balanced against the revenue opportunity of continuing to lend.

Figure 3: Securities lending activity for US passive funds from 2004 to 2010

Mean (%)	Small-cap funds	Mid-cap funds	Large-cap funds
Tracking error enhancement	59.46%	21.57%	22.72%
Securities lending income as a fraction of net investment income	14.38%	5.33%	1.20%
Impact of securities lending on reported fund performance	0.12%	0.062%	0.02%

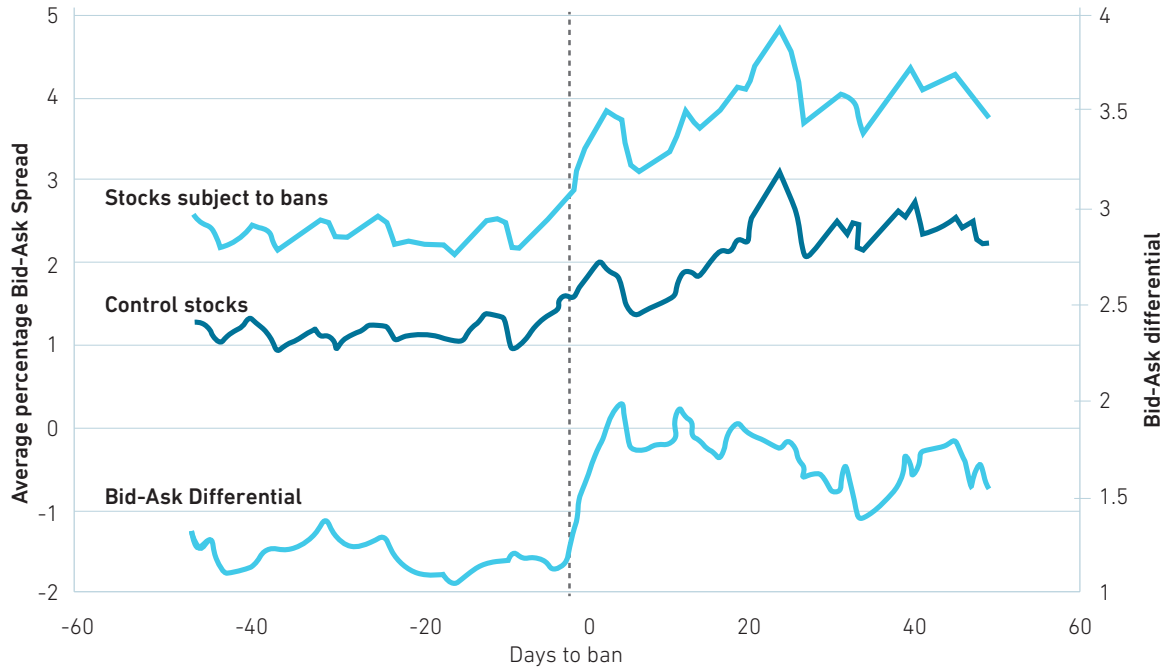
Source: Dunham and Simpson (2015)

Short selling's impact on market efficiency

Having discussed the impact of securities lending supply on stock prices and fund performance, we now examine short selling's role in capital markets. In theory, short selling is essential for a functioning, liquid market. A central tenet of finance theory is the ability for rational arbitrageurs to buy or sell the stock with minimal friction to drive toward price realization. In practice, however, whether short-sellers have a positive effect on markets is still debated and has driven some policymakers to institute regulations on short-selling. Turning to financial literature, we can explore the impact of short selling on these dynamics. Multiple papers have studied how short sellers impact market efficiency and can be separated into three major camps: the "macro view", natural experiments and time- or cross-sectional comparisons using short activity.

Two *Journal of Finance* papers took a "macro view" by looking at cross-country evidence of market efficiency gains coming from the ability to short stocks. First, **Bris, Goetzmann and Zhu (2007)** reveal that across 46 different equity markets, prices adjust more symmetrically to good and bad news when short sales are allowed, promoting price discovery and liquidity. They find evidence that short sale restrictions exacerbate bear market downturns at the country level, but not at the level of individual stocks due to other factors being more significant in explaining negative stock returns, such as elevated trading volume, country- and time-specific effects. Later, **Beber and Pagano (2013)** examine the short sale bans during the Global Financial Crisis. They concluded that the bans harmed stock liquidity, price discovery and failed to support prices – particularly for small cap stocks.

Figure 4: Average bid-ask spread of stocks subject to short-selling bans and similar stocks exempt from the ban



Source: Beber and Pagano (2013)

Foley-Fisher, Gissler and Verani (2019) find a similar result not for stocks but for bonds, looking at American International Group's (AIG) suspension of lending during the crisis. The authors report a statistically and economically significant decrease in liquidity for corporate bonds primarily held by AIG after the firm shut down their securities lending program, suggesting that large market players can have detrimental impact on liquidity as well.

Using daily short flow data, **Boehmer and Wu (2013)** run a time-series and cross-sectional study. Their results suggest increases in shorting flow are associated with improvements in the time it takes for information to be incorporated into prices. Also leveraging order flow, **Comerton-Forde, Jones, and Putnins (2016)** find that short sales fall in two main camps: those that provide liquidity and those that demand it. Providers of liquidity tend to be contrarian and involved in the market when spreads are particularly wide, while those that demand it tend to be more short-term momentum traders. The paper finds that liquidity-supplying short sales provide a stabilizing force in stock markets. They help to narrow spreads, limit price spikes and provide liquidity, while there is no evidence that liquidity-demanding short-sellers are any different from other liquidity demanders.

A central tenet of finance theory is the ability for rational arbitrageurs to buy or sell the stock with minimal friction to drive toward price realization.

Summary

The multiple experiments performed across academia over the years that span differing time windows, regions, and securities, result in a comprehensive and unbiased view of the effect of securities lending. The weight of empirical evidence suggests that short selling is an important market function, improving market efficiency and providing liquidity when it is needed most. Additionally, existing studies suggest that securities lending, which facilitates short selling through the lending of securities, improves performance of passive funds and allows active managers to earn additional return on securities they are mandated to hold, without being detrimental to stock prices.

References

Diamond, D. and Verrecchia, R. "Constraints on Short-Selling and Price Adjustment to Private Information." Journal of Financial Economics (1987).

D'Avolio, G. "The Market for Borrowing Stock." Journal of Financial Economics (2002).

Boehmer, E., Jones, C. and Zhang, X. "Which Shorts are Informed?" Journal of Finance (2008).

Christophe, S., Ferri, M. and Hsieh, J. "Informed Trading Before Analyst Downgrades: Evidence from Short Sellers." Journal of Financial Economics (2010).

Boehmer, E., Jones, C., Wu, J. and Zhang, X. "What do Short Sellers Know?" Review of Finance (2020).

Kaplan, Moskowitz and Sensoy. "The Effects of Stock Lending on Security Prices: An Experiment." Journal of Finance (2013).

Cohen, L., Diether, K. and Malloy, C. "Supply and Demand Shifts in the Shorting Market." Journal of Finance (2007).

Nagel, S. "Short Sales, Institutional Investors and the Book-to-Market Effect." Journal of Finance (2005).

Beneish, M.D., Lee, C.M.C and Nichols, D.C. "In Short Supply: Short-Sellers and Stock Returns." Journal of Accounting and Economics (2015).

Miller, E.M. "Risk, Uncertainty and Divergence of Opinion." Journal of Finance (1977).

Chuprinin, O. and Massa, M. "To Lend or Not to Lend: The Effect of Equity Lenders' Preferences on the Shorting Market and Asset Prices." Working Paper (2013).

Blocher, J. and Zhang, C. "Who is Buying and (Not) Lending When Shorts are Selling?" Journal of Financial Markets (2016).

Evans, Ferriera and Prado. "Fund Performance and Equity Lending: Why Lend What You Can Sell?" Review of Finance (2017).

Dunham and Simpson. "The Impact of Securities Lending on Index Fund Performance." Journal of Investing (2012).

Dunham, L. and Simpson, T. "An Analysis of the Impact of Securities Lending on the Performance of ETFs." Journal of Wealth Management (2015).

Palia and Solinski. "Passive Asset Management, Securities Lending and Stock Prices." Working Paper (2019).

Foley-Fisher, Gissler and Verani. "Over-the-Counter Market Liquidity and Securities Lending." BIS Working Paper (2019).

Comerton-Forde, Carole. Jones, Charles. Putnins, Talis. "Shorting at Close Range: A Tale of Two Types." Journal of Financial Economics (2016).

Aggarwal, Saffi and Sturgess. "The Role of Institutional Investors in Voting: Evidence from the Securities Lending Market." Journal of Finance (2015).

Beber and Pagano. "Short-Selling Bans Around the World: Evidence from the 2007-09 Crisis." Journal of Finance (2013).

Boehmer, E. and Wu, J. "Short-Selling and the Price Discovery Process." Review of Financial Studies (2013).

Kalay, Karakas, and Pant. "The Market Value of Corporate Votes: Theory and Evidence from Option Prices." Working Paper (2013).

Boehmer and Wu. "Short-Selling and the Price Discovery Process." Review of Financial Studies (2012).

Saffi and Sigurdsson. "Price Efficiency and Short-Selling." Review of Financial Studies (2010).

Bris, Goetzmann and Zhu. "Efficiency and the Bear: Short Sales and Markets Around the World." Journal of Finance (2007).

Tsai, Wu, and Xu. "Does capital market drive corporate investment efficiency? Evidence from equity lending supply." Journal of Corporate Finance (2021).

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