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ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

FINANCE RESEARCH SEMINAR SUPPORTED BY UNIGESTION

"Equity Lending, Investment Restrictions and Fund Performance"

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Abstract

The dramatic increase in the percentage of mutual funds lending equities suggests that lending is an increasingly important source of income for investment advisors. However, borrowing demand for equities is a strong signal of future underperformance. We find that funds that end equities underperform otherwise similar funds in spite of lending income. The adverse effect of equity lending is concentrated in funds that cannot act on the short-selling signal due to a fund family setting investment restrictions for a manager in order to diversify its portfolio of fund offerings across different investment objectives. When restrictions prevent a manager from selling a stock with strong borrowing demand, stock lending will at least generate some income that minimizes the effects of future stock underperformance.

Friday, February 8th, 2013, 10.30-12.00
Room 126, 1st floor of the Extranef building at the University of Lausanne

Equity Lending, Investment Restrictions and Fund Performance*

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This Version: January 2013

Abstract

The dramatic increase in the percentage of mutual funds lending equities suggests that lending is an increasingly important source of income for investment advisors. However, borrowing demand for equities is a strong signal of future underperformance. We find that funds that lend equities underperform otherwise similar funds in spite of lending income. The adverse effect of equity lending is concentrated in funds that cannot act on the short-selling signal due to a fund family setting investment restrictions for a manager in order to diversify its portfolio of fund offerings across different investment objectives. When restrictions prevent a manager from selling a stock with strong borrowing demand, stock lending will at least generate some income that minimizes the effects of future stock underperformance.

Keywords: Mutual funds, Index funds, Performance, Security lending

JEL: G12, G14, G15, G23

* The authors thank Lauren Cohen, Tariq Haque, Marc Lipson, Pedro Matos, Adam Reed, Jonathan Reuter, Pedro Santa Clara, Clemens Sialm, Duarte Trigueiros; seminar participants at Georgetown University, Nova School of Business and Economics, Darden School/McIntire School at the University of Virginia; and conference participants at the 1st Luxembourg Asset Management Summit, 2012 Portuguese Finance Network Conference, AEFIN 20th Finance Forum, and 25th Australasian Finance and Banking Conference for helpful comments and suggestions. We thank David Antunes, André Chen, André Fernando, Carlos Mirpuri, Naim Patel, Fábio Santos, Filipe Sodagar, and Francisco Vital for outstanding research assistance.

1. Introduction

A securities lending program offers a unique opportunity for mutual funds to generate additional income. By lending the securities in their portfolio, funds earn both interest and appreciation on the collateral of loaned securities. According to Data Explorers, mutual funds earned almost $1.5 billion in security lending income in 2008. While the income that funds generate through security lending is substantial, short-selling/borrowing demand for a stock is a strong signal of future underperformance. While many investors cannot profit from this short-selling demand signal due to arbitrage limits, in particular the difficulty in borrowing the stock, fund managers who are long the stock of interest, would only have to sell their shares in order to benefit. Thus, it is an empirical question whether the income generated from security lending outweighs the potential improvement in a fund's performance if the manager sells the stock in response to a short-selling demand signal.[1]

Using a sample of 2,093 active and 186 passive equity funds over the 1996–2008 period, we examine security lending practices and their impact on mutual fund performance. The funds' security lending practices and investment restrictions data are drawn from the SEC's N-SAR filings and indicate whether or not securities lending is allowed by the fund's prospectus and whether or not a fund actually lends securities.

We find that 81% of all funds in our sample are allowed to lend, but only 28% are actually lending, on average, over the 1996–2008 period. While the willingness to lend shares among U.S. mutual funds has increased dramatically over our sample period (from 11% of active funds

[1] Research that shows that short selling predicts future negative abnormal returns includes Brent, Morse, and Stice (1990), Senchank and Starks (1993), Aitken, Frino, McCorry, and Swan (1998), Danielsen and Sorescu (2001), Dechow, Hutton, Meulbroek, and Sloan (2001), D'Avolio (2002), Desai, Ramesh, Thiagarajan, and Balachandran (2002), Geczy, Musto, and Reed (2002), Jones and Lamont (2002), Lamont (2004), Asquith, Pathak, and Ritter (2005), Boehmer, Jones, and Zhang (2008), Diether, Werner, and Lee (2009), and Boehmer, Huszar, and Jordan (2010).

in 1996 to 43% in 2008), we find that actively managed equity funds that lend securities underperform otherwise similar funds that do not lend. The 4-factor risk-adjusted net return difference between funds that lend and those that do not lend is statistically and economically significant at between 0.5% and 1% per year. The finding is robust to the inclusion of many family- and fund-level controls, including style and fund fixed effects as well as two-stage Heckman selection and propensity score matching models.

If the decision to lend shares is based on the demand by short sellers for a fund's stock holdings, our findings suggest that short sellers are better informed than fund managers. Put another way: the funds that lend have a long position in the stocks that are most desired by short sellers. The idea that short sellers are better informed investors is not new, and it is supported by a host of both theoretical and empirical papers.[2] What is surprising about our fund performance results is that through their security lending operation, fund families and managers receive a clear signal about the demand by short sellers for the stocks in their portfolio but then fail to act on that signal by selling those stock holdings.

One potential explanation for the observed fund underperformance is that the security lending decision is made at the advisor level for family-wide reasons, which is consistent with the idea that family-level profit maximization concerns can dominate fund-level performance concerns (e.g., Gaspar, Massa and Matos (2006)). Anecdotally, larger fund families often diversify their product offerings across different investment objectives in order to maximize total assets under management and, in turn, family-wide profits. In describing the compensation

[2] Diamond and Verrecchia (1987) argue that given the costs associated with short selling (i.e., loss of proceeds, lending fees, and dividends) investors that engage in shorting are likely to be informed traders. Engelberg, Reed, and Ringgenberg (2012) argue that the information advantage of short sellers lies in their ability to process publicly available information. Christophe, Ferri, and Angel (2004), Christophe, Ferri, and Hsieh (2010), Karpoff and Lou (2010), and Boehmer, Jones, and Zhang (2011) find evidence that short sellers actually anticipate earnings surprises, financial misconduct, and analyst downgrades.

system at the Massachusetts Financial Services fund family, Chief Investment Officer Kevin Parke explained this strategic consideration:

> "…some types of stocks are always out of favor, and I want our managers to stay with those stocks, picking the best of the worst. When they come back into favor, MFS will be prepared for the inevitable surge in inflows. So I will continue to pay a manager well who is doing a good job in an out-of-favor fund. But they must stick to picking the best stocks in their respective category. I'm not going to reward a value manager who beat her index by including tech stocks (when tech stocks were hot) in her portfolio. That is cheating. We need to build an excellent track record and expertise in each of our asset classes over the long run."[3]

If a manager was allowed complete flexibility in managing their portfolio, decisions to purchase securities outside their investment objective or to switch into and out of cash could potentially harm the fund families' overall product strategy of which funds to offer in each investment objective.[4] If fund managers are restricted from selling stocks in a given style in order to accommodate these family-wide strategic considerations, they might be unable to respond to the observed short-selling demand signal.

Consistent with this idea, we find that funds that lend securities are from larger fund families with fund offerings that are well diversified across investment objectives. Also consistent with these family-wide considerations and the effectiveness of the family's product diversification strategy, we find that families with securities lending programs are better at retaining assets

[3] "Massachusetts Financial Services," HBS Case #902-132.

[4] For example, in 1999, value fund managers dramatically underperformed growth fund managers. If value managers started purchasing technology stocks that year to try and generate similar fund returns, those same managers would have missed the outperformance of value stocks relative to growth stocks after the collapse of the Internet bubble.

within the family (i.e., outflows from one fund are more likely to be recaptured as inflows to another fund in the family instead of leaving the family altogether).

To assess whether or not investment restrictions prevent these managers from acting on the short-selling signal, we construct an index of fund manager restrictions following Almazan, Brown, Carlson, and Chapman (2004). We find that the underperformance of funds that lend stocks is concentrated among funds in which the manager faces more investment restrictions. In addition, we find that index funds that lend stocks do not underperform otherwise similar index funds, in line with a lack of manager discretion on the part of those index funds over the fund's holdings.

While it is difficult to assess a manager's motivation for selling a stock, we examine a sample where a manager simultaneously manages a fund that is allowed to lend securities and a fund that is not allowed. We compare how the manager responds to stocks that are "hard-to-borrow" in the two different funds to assess the strategic implications of engaging in equity lending. We find that managers respond to a short-selling demand signal by selling the stock in their portfolio, but the effect is twice as large in the fund that is prohibited from lending versus the fund that is allowed to lend (6.70% versus 3.53% of shares held in the portfolio). This result corroborates the interpretation of our findings that those funds that can act upon the information signal received from the stocks in high borrowing demand outperform funds that cannot. Security lending by restricted funds at least generates income to mitigate the underperformance associated with holding stocks with strong borrowing demand.

One alternate explanation for the observed underperformance is agency costs associated with the use of an affiliated lender. Adams, Mansi, and Nishikawa (2011) examine the equity lending practices of index funds and the role of mutual fund boards and affiliated lending agents

in negotiating what fraction of the security lending income is kept by the fund. They find that index funds with an affiliated lending agent generate less lending income consistent with agency problems inherent in negotiating with an affiliated agent. We examine whether the relation between performance and equity lending among active funds is explained by the impact of lending agent affiliation. We find that equity lending is more negatively related to performance for funds with affiliated lending agents, but this effect is statistically insignificant in the case of active funds.

Our paper contributes to the understanding of the determinants of mutual fund performance. Most of the literature studies the performance consequences associated with portfolio holdings or long stock positions (e.g., Kacperczyk, Sialm, and Zheng (2005), Cremers and Petajisto (2009)). There are, however, a few studies that examine short stock positions. Agarwal, Boyson, and Naik (2009) find that mutual funds that implement hedge fund strategies outperform traditional mutual funds. Chen, Desai, and Krishnamurthy (2012) find that funds that short stocks as part of their investment strategy generate significant abnormal performance from both their long and short stock position.

We also contribute to the understanding the economics of security lending, in particular the relation between security lending and performance and the rationale of fund families in initiating security lending programs. Our paper is related to a recent paper by Kaplan, Moskowitz, and Sensoy (2012) that studies the effect on stock prices of a shock to the supply of lendable shares. They conducted an experiment for an anonymous money manager in 2008–2009 and found that the returns to stocks that are made available to lend are no different from the other stocks, which suggests that funds can lend out their stocks to earn lending fees without fearing negative consequences for the value of their holdings. Additionally, Rizova (2012) shows that security

lending is a family-level decision driven by economies of scale and past performance.

Our paper provides new insights about the fund manager decision to lend shares by studying the impact of stock lending on the performance of a large sample of actively managed mutual funds over an extended period between 1996 and 2008, which contains periods of high and low demand for borrowing stocks. Our results indicate that, on average, equity lending has sizable adverse effects on fund performance. This result is not related to the effect of shorting supply on stock prices, but rather to how managers respond to borrowing demand for a stock by comparing the performance of managers who hold and lend the stock versus managers who sell the stock. We conclude that security lending can be a profitable business, but fund managers should be aware of the potential adverse effects on stock prices from securities lending.

2. Data

Investment companies are required by the Investment Company Act of 1940 to file semiannual and annual N-SAR reports with the SEC. The N-SAR form includes 133 numbered questions related to the investment practices of each fund.[5] The responses to these questions provide information on trading activities, including whether or not the fund is allowed by its prospectus to lend securities and whether or not it actually lends equities (question 70N) during the reporting period. The filings also contain other descriptive information about a fund including whether the fund is an open-ended, insurance, bond, equity, balanced, or index fund.

We first gathered the N-SAR-B annual fund filings, from the SEC's Edgar database starting in 1996 and ending in 2008.[6] We focus on U.S. open-end domestic equity mutual funds, including both active and index funds. We obtained the filings for 3,113 funds, of which 2,898

[5] A list of the questions and subquestions is available at: http://www.sec.gov/info/edgar/forms/N-SARdoc.htm.
[6] Reporting began with a subset of funds in 1993 and was gradually phased in for all funds. All funds were required to report by the end of 1995.

are active funds and 215 are index funds. N-SAR reports are filed at a "series" level where a series consists of one or more funds. For each fund in the series, we hand collect the CUSIP and ticker. We then match each fund to the CRSP mutual fund database to collect data on performance and fund characteristics. For funds with multiple share classes, we compute fund-level variables by aggregating across the different share classes and eliminating duplicate share classes. After merging the N-SAR and CRSP data, our sample contains 2,279 funds, of which 2,093 are active funds and 186 are index funds. The sample is representative of the U.S. mutual fund industry as it covers 62% of the number of funds and aggregate TNA of equity funds in the CRSP mutual fund database (see Appendix B).[7]

The explanatory variables of interest are indicator variables that equal one for funds that are allowed to lend securities ("Security Lending Allowed") and funds that actually lend securities ("Security Lending Used") in each year. We also collect the income generated from lending ("Security Lending Income") and the collateral used to secure the security loan ("Security Lending Collateral") from the annual SEC N-CSR fillings. The income and collateral variables only cover the 2002–2008 period.

We introduce a number of novel fund variables that are important to our analysis. We obtained the holdings as reported in Morningstar for the sample period 1996–2008 for the funds in our sample and calculated the value-weighted average short interest and institutional ownership of the stocks in the fund's portfolio. Using these variables we calculated fund utilization, the fraction of shares shorted relative to the institutional ownership for the stocks in the fund's portfolio. Fund utilization controls for the short-selling demand, as proxied by short interest, and the lending supply, as proxied by institutional ownership.

[7] Other studies that use the N-SAR data include Edelen (1999), Almazan, Brown, Carlson, and Chapman (2004), Reuter (2006), Christoffersen, Evans, and Musto (2012), and Edelen, Evans, and Kadlec (2012).

We also calculate a measure of fund manager investment restrictions. Following the methodology of Almazan, Brown, Carlson, and Chapman (2004) and using the N-SAR-B fund filings, we construct a fund-level index of investment restrictions in each year. The index is constructed using the answers to six questions on investment restrictions: (1) borrowing of money, (2) margin purchases, (3) short selling, (4) writing or investing in options on equities, (5) writing or investing in stock index futures, and (6) investments in restricted securities. We code the answers as dummy variables that equal one if the fund is restricted. Restrictions are aggregated in three categories: use of leverage (1)–(3), derivatives (4)–(5), and illiquid assets (6). We take the average of the restriction dummies within each category and then take an average of the three categories. The resulting restriction index is between zero and one, and a higher score indicates a more constrained fund.[8]

Table 1 provides summary statistics for all the variables used in our analysis. The monthly CAPM, 3-factor Fama-French, and 4-factor Carhart alphas are calculated using factor exposures estimated over the previous 36 months. The average 4-factor alpha is slightly negative (14 basis points per month), which is consistent with previous studies. Fund characteristics include total net assets in millions of dollars (TNA), net fund flow as a percentage of TNA, expense ratio, fund turnover, active share, age, and performance rank within the investment style category. The variables also include fund family characteristics such as family TNA, average family net flows, expense ratio and active share (of actively managed funds), and the percentage of index funds,

[8] We also construct an alternative restriction index that includes the additional investment allowance/restriction questions in the N-SAR fillings: writing or investing in repurchase agreements, writing or investing in options on equities, writing or investing in options on debt securities, writing or investing in options on stock indices, writing or investing in interest rate futures, writing or investing in stock index futures, writing or investing in options on futures, writing or investing in options on stock index futures, writing or investing in other commodity futures, investments in restricted securities, investments in shares of other investment companies, investments in securities of foreign issuers, currency exchange transactions, loaning portfolio securities, borrowing of money, purchases/sales by certain exempted affiliated persons, margin purchases and short selling. The results using this alternative index are similar to those presented in the paper.

subadvised funds, and funds sold through brokers in the family. Our matched N-SAR-CRSP sample does not differ significantly from the CRSP sample in terms of the main fund characteristics such as fund size, age, expense ratio, and turnover (see Appendix B).

We examine the prevalence of security lending among mutual funds. Panel A of Table 2 and Figure 1 show a dramatic increase over time in both the percentage of active funds that are allowed to lend securities and the percentage of funds that actually lend securities. In the first part of our sample period, before 2000, less than 25% of the active funds actually lent their stock holdings. In the 2000s, the percentage of active funds lending out their holdings increased significantly, reaching 43% in 2008. The percentage of index funds engaging in security lending has always been higher relative to that of active funds, but we also observe an increase in the willingness to lend securities in recent times. The percentage of index funds lending their holdings increased significantly from 16% in 1996 to 65% in 2008.

Panel B of Table 2 shows the transition probabilities between the different security lending states. During the sample period, 17.8% of active funds and 38.5% of index funds switch from prohibiting to allowing security lending. Less than 3% of the active and index funds switch from allowing to prohibiting security lending.

3. Security Lending and Fund Performance

In this section, we study the relation between security lending and fund performance. A fund generates additional income when it lends its stock holdings, but the short-selling/borrowing demand for a stock is a strong signal of future underperformance. It is an empirical question whether or not the income generated from stock lending outweighs the potential gain a manager could obtain by responding to this short-selling demand signal. We examine this trade-off through the analysis of the fund's risk-adjusted performance and equity lending activity.

3.1 Univariate Results

We first analyze the effects of equity lending on after-fee performance by splitting funds into two portfolios. One portfolio includes funds that lend out shares in a given year, and the other portfolio includes the funds that refrain from lending shares. We calculate equal-weighted and value-weighted monthly excess returns (over U.S. T-bills) for each portfolio and then measures of risk-adjusted portfolio performance using the CAPM, 3-factor, and 4-factor models over the whole sample period. We ran the analysis separately for active funds (Panel A) and index funds (Panel B), and the results are presented in Table 3.

Panel A shows that active funds that lend their stock holdings significantly underperform funds that do not lend their stock holdings. On an equally weighted basis, the difference between funds that lend and funds that do not lend is 12 basis points per month in terms of excess returns, and 8 basis points per month in terms of alphas. The differences in performance are similar using value-weighted portfolio returns and are statistically significant in all cases with exception of the CAPM model.

Panel B shows that index funds that lend their stock holdings slightly underperform funds that do not, but the differences are not statistically significant in terms of alphas on a value-weighted basis. This suggests that the underperformance associated with equity lending is more pronounced among smaller funds in the sample of index funds.

3.2 Multivariate Results

The economic magnitude of the underperformance of funds that lend securities is large and could reflect systematic differences between funds that lend securities and funds that do not. The portfolio analysis does not take into consideration that funds that engage in security lending may be fundamentally different from those that do not. We next estimate panel regressions of

monthly fund after-fee performance on the security lending used dummy and other fund characteristics. The dependent variable is the fund's monthly 4-factor alphas. We control for short-selling demand and lending supply using the fund utilization variable–the ratio of the average short interest of the portfolio holdings (i.e., short-selling demand) to the average institutional ownership of the portfolio holdings (i.e., lending supply). Other control variables include the expense ratio, total net assets (TNA), net flow, turnover, family TNA, and percentage of funds sold through brokers in the family. The standard errors are clustered at the fund level to correct for within fund serial correlation. Panel A of Table 4 shows the regression estimates for the sample of active funds and Panel B for the sample of index funds.

The regression estimates in Panel A, column (1), show a negative and significant relation between fund performance and security lending. This indicates that active funds that lend out their stock holdings underperform otherwise similar funds that do not make their holdings available to the lending market. The effect is economically important as funds that lend their holdings underperform other funds by six basis points per month in terms of 4-factor alphas.[9]

The coefficients of the other fund characteristics are in line with previous studies. Fund size is negatively related to performance, while family size is positively related (Chen, Hong, Huang, and Kubik (2004)). Expenses negatively impact performance (Gil-Bazo and Ruiz-Verdu (2009)), and broker-sold funds underperform even after controlling for expenses (Bergstresser, Chalmers, and Tufano (2009)). It is interesting to note that the coefficient on the level of utilization of the fund's portfolio holdings is negative and strongly significant, which is consistent with the previously documented negative relation between short-selling demand and future stock performance.

[9] We obtain similar estimates using the other measures of fund performance used in Table 3.

To address the potential concern that the fund performance result is due to an omitted variable such as portfolio manager skill and style differences, columns (2)–(4) include investment style, time, and fund fixed effects. This controls for unobserved sources of fund heterogeneity and addresses the joint determination problem in which an unobserved time-invariant variable simultaneously determines fund performance and fund characteristics. The economic magnitude of the security lending effect on performance remains sizable in all specifications.

Columns (1)–(4) present estimates using a sample that includes both funds that are allowed to lend securities and funds that are not allowed. If funds that allow security lending are systematically different from funds that prohibit lending, our results could be spurious. To address this concern, columns (5)–(8) present estimates using only the sample of active funds that are allowed to engage in security lending, excluding funds that are prohibited from lending. Similar to the previous results, we find that funds that lend out securities underperform similar funds that are allowed to lend but refrain of doing so by four to seven basis points per month. Overall, the results on the sample of active funds suggests that the adverse effects on fund performance from continuing to hold stocks with strong short-selling demand outweighs the additional income generated by lending these stocks.

If this interpretation of our findings is correct, we should find that security lending does not negatively affect the risk-adjusted performance of index funds. In fact, the benchmark-adjusted performance of index funds would not be affected if an index fund were to lend its stock holdings. To assess whether or not this is the case, we separately estimate the security lending used coefficient for the sample of index funds with results presented in Panel B of Table 4. Consistent with our interpretation, the security lending used indicator variable is not statistically

significant at the 5% level in all specifications.

3.3 Treatment Effect Regression Results

An important concern with our finding is that the decision to initiate a security lending program is made, in part, at the fund family level. If families or funds with security lending programs differ systematically from families or funds that do not have programs, the observed relation between equity lending and fund performance might be spurious.

To address this issue, we repeat the performance analysis using a model that accounts for this self-selection. Because we observe the performance of both funds that are and are not allowed to lend securities, we use the two-stage Heckman procedure, including among the explanatory variables the Heckman's lambda constructed from the estimates of probit regressions on the likelihood of allowing security lending (Maddala (1983)). In the first stage, we estimate a probit model of whether or not security lending is allowed in each fund. The explanatory variables are fund family characteristics and fund characteristics. In the second stage we estimate the effect of equity lending on fund risk-adjusted performance correcting for selection bias. The dependent variable is the 4-factor alpha. We focus on the sample of active funds, excluding index funds from the analysis.

Panel A of Table 5 shows the first-stage probit regression estimates. The estimates in columns (1) and (2) show that larger fund families, families with a higher average expense ratio, families with a higher percentage of index funds, and families with a lower percentage of subadvised funds are more likely to initiate a security lending program. Families with lower average fund performance, as measured by the average fund performance rank within the investment objective, are also more likely to initiate a security lending program. Furthermore, families with more diverse fund offerings across investment objectives, as proxied by the

Herfindahl index of total net assets (TNA) in each Morningstar investment objective ("Investment Objective Herfindahl"), are more likely to allow security lending. The results suggest that initiating a security lending program is a family-wide decision related, in part, to the diversification of the family's overall product offerings across investment objectives. Columns (3) and (4) examine the individual fund decision to allow security lending. The estimates of the probit regression show that younger funds, funds with lower performance ranks, and funds with higher turnover are more likely to allow security lending.

Panel B of Table 5 shows the estimates of the second-stage fund performance regression results. Regressions include style or fund fixed effects. We find that the security lending used coefficient is negative and significant in all specifications. Thus, after controlling for self-selection using the treatment effects regression model, we continued to find that active funds that lend stocks underperform funds that do not lend stocks. The magnitudes of the security lending used coefficient (between four and eight basis points per month) are similar to those in Table 4. The lambda is positive and significant, which indicates that selection is indeed an issue, but the negative relation between security lending and fund performance persists after controlling for the selection bias.

3.4 Propensity Score Matching Results

We also use propensity score matching to compare the difference in performance of active funds that lend securities (treated sample) and funds that do not lend securities (control sample). Matching methods alleviate some of the concerns associated with linear regressions and mitigate asymptotic biases arising from self-selection. We estimate a probit of the fund's decision to lend securities (dependent variable is the security lending used dummy variable) based on observed family and fund characteristics. In each month, we then match each fund that lends securities

with the fund with the closest propensity score (nearest neighbor estimator) that does not lend securities.

Panel A of Table 6 reports the estimates of the probit of the fund security lending decision. Funds with higher utilization rate of fund holdings, larger funds, and funds with lower net flows are more likely to engage in security lending. In terms of fund family characteristics, we observe that families with lower average performance rankings, larger families, families whose funds have lower active share, families with more index funds, and families with more diverse fund offerings across investment objectives are more likely to have funds that lend out securities.

Panel B of Table 6 shows a comparison of average fund characteristics between the treated and nontreated samples and between the treated and control samples. There are significant differences between the treated and nontreated samples, but the control sample constructed using the propensity score matching technique is closer to the treated sample for every fund characteristic. In fact, there are no significant differences on the basis of key fund characteristics such as total net assets (TNA), expense ratio, turnover, average family active share, and average family performance rank. While statistically significant differences remain in some fund and family variables between the treated and control samples, these differences do not appear to be economically significant (e.g., the difference in average family expense ratio is 0.01%).

After identifying the control sample, we estimate the effect of security lending on fund performance. Panel C of Table 6 shows the average 4-factor alphas for the treated and control samples, as well as the difference and its p-value. The average fund in the treated sample has a negative alpha of 18 basis points per month and the average fund in the control sample has a negative alpha of 12 basis points per month. The estimated effect on risk-adjusted performance of security lending is a statistically significant six basis points per month, similar to our previous

estimates.

3.5 Effect of Investment Restrictions and Affiliated Lending Agents

We have shown that actively managed funds that lend securities underperform. This is perhaps not surprising given the documented relation between short-selling demand and the future underperformance of a stock. What is surprising is that fund managers receive a clear signal about the demand by short sellers for their stock holdings but then choose to lend the stocks instead of selling them in anticipation of the future price decrease. Why would they fail to act upon this signal?

One potential explanation is that fund managers might be limited in their ability to act upon the information signal. Almazan, Brown, Carlson, and Chapman (2004) show that management companies restrict managers' investment decisions through the use of various restrictions. In the N-SAR form (question 70N) mutual funds are asked to provide information on their investment activities and whether or not they are prohibited from using certain investment strategies. Following Almazan, Brown, Carlson, and Chapman (2004), we compute an index of investment restrictions a manager faces in the usage of leverage, derivatives, and illiquid assets. The value of the index ranges between zero and one, and a higher score indicates a more restricted fund (see the data section for a detailed description of the index). We interact the restriction index with the security lending used dummy variable to see how investment restrictions affect the relation between fund performance and security lending. If this channel is to explain our performance findings, we should find that the interaction variable coefficient is negative and significant.

Table 7 presents the estimate of performance regressions similar to those in Table 4 with style fixed effect but including the interaction variable. Column (1) shows that the coefficient on the interaction between the security lending used dummy variable and the restrictions index is

negative and significant. The interpretation is that the negative effect of equity lending on fund performance is concentrated among funds in which managers face more investment restrictions. This is consistent with security lending only negatively affecting fund performance when funds are restricted from selling stock holdings even though they observe the short-selling demand signal.

In an alternative test, we examine the effect of security lending on fund performance conditional on whether funds are allowed to trade options or futures, which could be used to hedge the future expected underperformance of the stocks held by the fund with short selling demand.[10] Column (2) shows that the negative effect of security lending on performance is offset in the case of funds that can trade options or futures. Funds that lend out stocks underperform similar funds by 11 basis points, but for those funds that can trade options and futures, the effect on performance is attenuated by 9 basis points. So the net effect of security lending on performance for those funds that are less restricted is nearly zero. This evidence is consistent with managers being able to act upon the information signal inherent in borrowing demand when they are less restricted.

An alternative explanation for the negative link between fund performance and security lending is that the income from lending the securities is insufficient to offset the potential adverse effect on the value of the fund's holdings due to agency costs. In a typical security lending arrangement, the lending income is split between the fund investors and the lending agent who facilitates the security lending. Adams, Mansi, and Nishikawa (2011) find that index funds with an affiliated lending agent earn lower investment returns on lent securities and less of

[10] We consider whether a fund is allowed to trade futures and options. Specifically, we consider whether a fund can trade equity options, debt options, index options, stock futures, option futures, commodity futures, interest rate futures, and option index futures.

the lending income is shared with the fund investors. If lending through an affiliated lending agent generates income for the fund family, the fund manager might be more inclined to lend in spite of the impact on fund performance because of the benefits for the family through the use of the affiliated lending agent.

In order to explore conflicts of interest as a channel by which security lending might affect fund performance, we gathered information on whether a fund uses an affiliated lending agent from the SEC N-CSR fillings. We examined this channel by looking at the performance differences between funds whose lending arrangements involve an affiliated lending agent and those that do not involve an affiliated lending agent. Column (3) shows that the coefficient of the interaction between the security lending used dummy and the affiliated lending agent dummy is negative, which is consistent with the evidence of a conflict of interest described by Adams, Mansi, and Nishikawa (2011); however, the effect is statistically insignificant in the sample of active funds. Moreover, the negative relation between security lending and performance remains negative and significant after we add the affiliated agent dummy and its interaction to the regression. The interpretation is that the presence of an affiliated lending agent enhances the negative effect of security lending on performance, but there is also a negative and significant effect when no affiliated lending agent is involved. The estimates in column (3) rule out that conflicts of interest are an important explanation for the negation relation between fund performance and security lending.

Overall, the results are consistent with the idea that fund managers recognize the negative signal about future performance inherent in the short-selling demand for the fund's holdings, but they are limited in their ability to act upon it. Security lending will at least generate some investment income improving the fund's performance when the fund manager is restricted to act.

3.6 Manager-Fund Pairs Results

It is difficult to assess and control for the manager's reasons for buying or selling a particular stock because we do not know the manager's information set. However, if we look at the decision of the same manager about the same stock in two different portfolios at the same time, we can assume the manager has the same information set for the stock, effectively controlling for these reasons to trade the stock. Moreover, if we compare the decision of the same manager with regard to the same stock between a portfolio in which security lending is allowed and a portfolio in which is prohibited, we can analyze how security lending affects the manager's decision to trade the stock.

To implement this test, we identify a sample of active funds where at least two funds have the same manager, but security lending is allowed in one fund and is prohibited in the other fund. We then identify those stocks that are held in both funds that become "hard-to-borrow" (i.e., stocks with high short-selling demand and limited borrowing supply).[11] A stock is classified as hard-to-borrow if it is in the top quartile of the distribution of short interest (excess shorting demand) and below the median of the distribution of institutional ownership (limited supply) in a given month. Using quarterly fund holdings around the month when the stock becomes hard-to-borrow, we calculate the change in the number of shares held (as a percentage of shares held in the portfolio) by the manager in each of the two funds and the difference between the two funds.[12]

Panel A of Table 8 shows that a fund manager decreases his position by 5.58% when a stock

[11] D'Avolio (2002) and Nagel (2005) show that short selling is more expensive when institutional ownership is low. Kolasinski, Reed, and Ringgenberg (2012) further show that lending fees are responsive to high short-selling demand.

[12] In the case where there are more than two funds for a given manager, we take the average for funds in which security lending is allowed and for funds in which it is prohibited.

becomes hard-to-borrow in the fund where security lending is prohibited. In the fund where securities lending is allowed, the manager only decreases his position in the same stock by 3.80%. The difference of 1.78%, which is statistically significant at the 10% level, suggests that when a fund manager is prohibited to lend, he is more likely to respond to the short-selling demand signal by selling the stock.

To refine the previous test, we split the sample of manager-fund pairs into two groups: funds that are allowed to lend securities but do not actually lend any securities in a given month (Panel B), and funds that are allowed to lend securities and actually lend securities in a given month (Panel C). In both panels, the comparison group remains the twin portfolio of the manager where security lending is prohibited. We expect that managers of funds that are allowed to lend but do not actually lend behave similarly in their restricted portfolio (Panel B). In contrast, we expect the difference in the position change to be greatest for managers who are allowed to lend and actually lend stocks in a portfolio versus their restricted portfolio (Panel C).

Panel B shows a statistically insignificant difference in the position change of the fund that is allowed to lend securities but does not lend versus the fund in which security lending is prohibited for the same manager-month. Panel C shows that a manager decreases his position when a stock becomes hard-to-borrow by 3.53% in the fund that lends securities, while the decrease is 6.70% in the fund in which security lending is prohibited. The difference of 3.17% is statistically significant at the 1% level.

Table 8 also reports the average expense ratio, total net assets (TNA), age, net flow and whether the fund is subadvised for each group of funds. Panel C shows that the funds where the manager is less responsive to the short-selling demand signal (funds where security lending is allowed and used) have lower expense ratios, smaller size, are older, have lower flows, and a

higher percentage of them are subadvised. This evidence is consistent with the idea that the funds with security lending programs in place that actually lend securities are less profitable for the fund family.

Overall, the evidence suggests that a manager is less sensitive to the short-selling demand signal when a securities lending program is in place, while the same manager responds more aggressively to the same signal in a fund portfolio where securities lending is not allowed.

3.7 Fund Flows Results

Why do fund families restrict funds' investment policies? In order to maximize assets under management, a key component of profitability, fund families often diversify their fund offerings across different investment objectives. That way if an investor in one of the family's funds redeems his shares due poor performance or other factors, the family has an alternate investment option to offer him. Successfully retaining the investor's assets in this way can enhance both the level and the stability of fund family profits. If fund managers were given complete flexibility in managing a portfolio, their decisions to purchase securities outside their investment objective or to switch into and out of cash could harm the fund families' overall product strategy of which funds to offer in each investment objective.[13] If the implementation of this family-wide product offering strategy requires managers to not deviate much from their designated investment style, regardless of whether or not that style is in favor, a security lending program will at least generate some income to mitigate the potential impact of holding stocks with short-selling

[13] For example, anecdotally during the Internet bubble, value funds had underperformed growth funds, and some value managers increased their exposure to Internet/technology/growth stocks. When the bubble burst and value funds subsequently outperformed growth funds, by deviating from their investment style, these funds would have missed that subsequent outperformance. As investors redeemed from growth/Internet/technology funds, fund families would have liked to steer those exiting investors into other family funds including their value funds. If the manager of those value funds had deviated from their investment style, family profitability could suffer as investors would look for value funds at other fund families.

demand. In this way the family can build a track record and expertise in each asset class and receive inflows from styles or asset classes favored by investors. Consistent with this idea, we find that families with fund offerings that are well diversified across investment objectives and families whose active funds deviate less from their benchmark (i.e., lower active share) are more likely to have security lending programs in place.

An alternative prediction of this suggested fund family strategy is related to the recapture of fund flows. If security lending programs and the family's diversification of their overall product offerings go hand in hand, these families should be better at retaining assets under management as outflows from a fund in the family will translate into inflows into another fund in the same family.

Using the inflow and outflow data from the N-SAR filings, we test this additional prediction. Table 9 shows regression estimates of the relation between fund inflows and outflows and outflows and inflows from all other funds in the family ("Family Outflows" and "Family Inflows"). Columns (1) and (2) report results where the dependent variable is monthly fund inflows, and columns (3) and (4) report results where the dependent variable is monthly fund outflows. The regression controls for other fund characteristics such as performance, expense ratio, size, turnover, and family size. We also control for (lagged) fund inflows and outflows and inflows and outflows into all funds in the same investment objective.

Column (1) shows a positive correlation between a fund's inflows and contemporaneous outflows from other funds in the same family, while column (3) shows a positive correlation between a fund's outflows and contemporaneous inflows from other funds in the same family. In columns (2) and (4), we expand the specifications in columns (1) and (3) to include an interaction of family inflows and outflows with the percentage of a family's funds that allow

securities lending ("Security Lending Allowed in Family"). The positive and significant coefficients of the interaction variables in columns (2) and (4) indicate that the family's ability to recapture assets (i.e., outflows from one fund translating into inflows to another fund) increases with the percentage of funds where security lending is allowed. In short, the evidence supports the notion that security lending allows a fund manager to stay close to its investment objective and be consistent with the overall fund family product strategy.

3.8 Effect of Short-Selling Demand

Mutual fund boards face a trade-off when making decisions about allowing security lending. While lending fees are an additional source of income, security lending can negatively affect the value of fund holdings. We estimate the effect of security lending on fund performance in periods with different levels of short-selling/borrowing demand and lending fees. Table 10 shows estimates of fund performance regressions (dependent variable is the 4-factor alpha) with style fixed effects for different groups of fund-month observations based on the level of short-selling demand and lending fees.

Cohen, Diether, and Malloy (2007) show that large positive shifts in the demand for share loans can be manifested in increased lending fees. Kolasinski, Reed, and Ringgenberg (2012) corroborate that the slope of the supply becomes positive and steeper when demand shocks drive quantity to abnormally high levels. However, when demand to short is low, the loan supply schedule is essentially flat and that specialness is invariant to demand shocks.

We first consider whether the negative effect on performance is stronger when the short interest of the fund holdings is lower. We classify a fund as having low short interest if in a given month its value-weighted average short interest of fund holdings ("Fund Short Interest") is in the bottom three quintiles of the distribution. All other observations are classified as high short

interest. Column (1) shows that the security lending used dummy variable coefficient is negative and significant in the low fund short interest subsample, while column (2) shows that the security lending used dummy coefficient is insignificant in the high fund short interest subsample. The interpretation is that funds that lend out shares underperform otherwise similar funds, but the negative effect on performance is offset if they hold the most shorted stocks. Funds that hold the stocks with increased likelihood of being on special receive a fee high enough to compensate for the adverse effect on stock price of the subsequent short selling.

Nagel (2005) shows that short selling is more expensive when institutional ownership is low. We therefore examine how fund holdings are more expensive to borrow as measured by fund utilization—the ratio of short interest (short-selling demand) to institutional ownership (short-selling supply) based on fund holdings. We classify a fund as low fund utilization if it is in the bottom three quintiles of the distribution and as high fund utilization if it is in the top two quintiles of the distribution. Columns (3) and (4) show that the security lending used dummy variable coefficient is negative and significant in the low fund utilization subsample, but it is statistically insignificant in the high fund utilization subsample. This indicates that funds that hold stocks with high levels of utilization face a less negative performance consequence associated with lending their shares.

Kaplan, Moskowitz, and Sensoy (2012) conduct a lending experiment for a single anonymous money manager during the 2007–2008 financial crisis when lending fees were abnormally high. They found that the returns to stocks that are made available to lend are no different from the other stocks, which suggests that the average loan fees for high-demand stocks are high enough to compensate the impact from lending on stock prices. To determine whether it is beneficial to actually engage or abstain from security lending practices during market

downturns, we separately consider the financial crisis period characterized by high short-selling demand and high lending fees from other periods. The crisis period was between October 2007 and December 2008.[14]

Column (5) of Table 10 shows that the negative effect of security lending on performance is statistically and economically significant outside of the crisis period. In contrast, column (6) shows that funds lending shares during the crisis period obtain lending fees that compensate the subsequent negative price effect of short selling as indicated by the insignificant coefficient on the security lending used dummy.

The results in this section show no adverse effects on fund performance during periods of high short-selling demand and lending fees such as during the 2007–2008 financial crisis, which is consistent with the evidence in Kaplan, Moskowitz, and Sensoy (2012). However, in the case of low lending fee stocks, the fees are not sufficiently high to make up for the potential adverse effect on stock prices from security lending.

3.9 Robustness

So far, we have presented results using a dummy variable that indicates whether a fund lends its stock holdings or not, but it does not take into account what fraction of the portfolio is lent or how much investment income is generated from lending. Table 11 repeats the analysis in Table 4 using the actual lending income and collateral instead of the security lending used dummy. This analysis is restricted to the 2002–2008 period and a subsample of funds for which data on lending income and collateral are available.

We find that security lending is negatively associated with fund performance. There is a

[14] Prado (2012) shows that loan volumes and fees reached a new high during the 2007–2008 financial crisis and actually triggered institutional buying. The average loan fee increased from 15 basis points to over 1% from 2006 to 2008.

negative relation between fund performance and lending income in column (1), although the relation with collateral is statistically insignificant in column (2).[15] When including both the collateral as well as security lending income in column (3), the coefficient on collateral becomes positive and significant, while the security lending income coefficient remains negative. A higher collateral value could signify more bargaining power as a lender, leading to better lending terms.

4. Conclusion

We show a substantial increase in security lending for equity funds in 1996–2008. The practice of lending shares was limited to less than 25% of the active funds before 2000, while the number of funds lending their shares increased significantly to 43% by 2008.

We studied the effects of security lending for fund performance. We find that active funds that engage in security lending underperform otherwise similar funds that do not lend securities. The findings are robust to the inclusion of many family- and fund-level controls, including style and fund fixed effects, matching methods, and two-stage Heckman selection model, suggesting that unobserved fund heterogeneity and self-selection does not explain our findings.

The negative relation between fund performance and security lending seems to be explained by the idea that family-level profit maximization concerns dominate fund-level performance concerns. We find that funds that lend securities are from larger fund families with fund offerings that are well diversified across investment objectives. Moreover, we find that the underperformance is concentrated among funds with greater investment restrictions. The

[15] While the statistically insignificant coefficient on the security lending collateral variable in column (2) is surprising, it is important to note the difference in how the lending income and collateral variables are calculated. In the N-CSR filings, security lending income captures the total lending income for the 12-month period. Security lending collateral, however, is the most recent snapshot of the collateral held by the fund, and not the average collateral held over the 12-month period. Because it gives a more comprehensive assessment of the fund's lending over the whole period, we expect that lending income is a better proxy for lending activity than collateral.

interpretation is that fund managers are limited in their ability to sell the stock when they receive the short-selling demand signal due to investment restrictions in line with the fund families' overall product strategy of which funds to offer in each investment objective. In this setting, stock lending will at least generate some income that minimizes the effects of future stock underperformance.

We conclude that the decision to allow security lending by mutual funds has important implications for fund performance. While lending fees can be an additional source of income to the fund, the decision to hold stocks with strong short-selling demand can negatively affect future fund performance. Mutual fund boards and fund managers should consider this potential trade-off when making decisions about security lending programs. This paper contributes to the understanding of the consequences of security lending for performance and helps to shed light on the issue of why fund families initiate security lending programs and why such programs may be detrimental to individual fund performance.

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Table 1
Summary Statistics

This table presents mean, median, standard deviation, and number of observations of the fund and family variables. The sample consists of equity mutual funds with N-SAR filings and CRSP mutual funds data over the 1996–2008 period. Refer to Table A.1 in the Appendix for variable definitions.

	Mean	Median	Standard Deviation	Observations
Excess Return (% per month)	0.12	0.50	5.09	122,034
CAPM Alpha (% per month)	0.02	-0.07	2.37	122,034
3-Factor Alpha (% per month)	0.20	-0.04	4.29	122,034
4-Factor Alpha (% per month)	-0.14	-0.14	1.87	122,034
Security Lending Allowed	0.85	1.00	0.35	122,034
Security Lending Used	0.42	0.00	0.49	122,034
Security Lending Income	0.04	0.02	0.06	30,318
Security Lending Collateral	0.10	0.07	0.09	26,928
Fund Short Interest (%)	2.23	1.21	2.61	122,034
Fund Institutional Ownership (%)	64.95	62.59	11.76	122,034
Fund Utilization (%)	3.10	2.00	3.05	122,034
Expense Ratio (%)	1.24	1.22	0.50	122,034
TNA ($ millions)	1,788	310	6,913	121,986
Net Flow (%)	0.39	-0.23	4.63	121,995
Turnover (%)	92.36	65.00	158.46	122,034
Active Share (%)	72.66	78.38	22.74	108,638
Performance Rank	1.99	2.00	1.33	121,962
Age (years)	10.76	7.00	12.16	122,034
Family TNA ($ millions)	205,450	28,783	776,865	122,034
Average Family Performance Rank	2.00	2.00	0.72	122,025
Average Family Expense Ratio (%)	1.29	1.26	0.41	121,146
Investment Objective Herfindahl	0.33	0.20	0.29	122,034
Family Net Flow (%)	0.04	0.00	4.52	122,020
Average Family Active Share (%)	77.26	77.61	10.08	118,867
Index Funds in Family (% total)	6.86	0.00	13.62	122,034
Subadvised Funds in Family (% total)	26.49	6.06	35.69	122,034
Broker Funds in Family (% total)	29.27	30.00	21.10	122,034
Restriction Index	0.30	0.24	0.27	122,034
Options-Futures Allowed	0.68	0.88	0.35	122,034
Affiliated Lending Agent	0.11	0.00	0.31	104,319

Table 2
Frequency of Security Lending by Mutual Funds

Panel A reports the number of active and index equity funds that are allowed and engage in security lending by year. The sample consists of equity mutual funds with N-SAR filings and CRSP mutual funds data over the 1996–2008 period. Panel B reports the transition probabilities for the security lending allowed and security lending used states. Refer to Table A.1 in the Appendix for variable definitions.

Panel A: Number of Funds

	Active Funds				Index Funds			
Year	Total	Security Lending Allowed	Security Lending Used	Security Lending Used % total	Total	Security Lending Allowed	Security Lending Used	Security Lending Used % total
1996	461	333	50	10.8	25	20	4	16.0
1997	575	428	69	12.0	33	20	5	15.2
1998	746	562	110	14.7	61	48	19	31.1
1999	899	701	162	18.0	70	56	22	31.4
2000	1,206	951	281	23.3	107	88	34	31.8
2001	1,361	1,099	348	25.6	118	103	41	34.7
2002	1,435	1,218	464	32.3	141	131	58	41.1
2003	1,493	1,245	483	32.4	149	139	66	44.3
2004	1,523	1,278	552	36.2	145	137	71	49.0
2005	1,518	1,263	560	36.9	136	131	76	55.9
2006	1,517	1,277	606	39.9	134	128	69	51.5
2007	1,471	1,252	628	42.7	130	125	81	62.3
2008	1,385	1,195	599	43.2	118	113	77	65.3
Total	2,093	1,928	1,014	28.3	186	181	106	40.7

Panel B: Transition Probabilities (%)

Active Funds

Security Lending Allowed			Security Lending Used		
	No_t	Yes_t		No_t	Yes_t
No_{t-1}	82.2	17.8	No_{t-1}	91.3	8.7
Yes_{t-1}	2.9	97.1	Yes_{t-1}	8.5	91.5

Index Funds

Security Lending Allowed			Security Lending Used		
	No_t	Yes_t		No_t	Yes_t
No_{t-1}	61.5	38.5	No_{t-1}	87.1	12.9
Yes_{t-1}	2.6	97.4	Yes_{t-1}	5.5	94.5

Table 3
Fund Performance and Security Lending: Univariate Analysis

This table reports the equal- and value-weighted average abnormal returns (in percentage per month) of active and index funds that lend out shares versus funds that are prohibited to lend shares. Portfolio excess returns, CAPM, Fama and French 3-factor and Carhart 4-factor alphas are presented. The sample consists of equity mutual funds with N-SAR filings and CRSP mutual funds data over the 1996–2008 period. *p*-values are in parentheses. ***, **, * denote that the coefficient is significant at the 1%, 5%, and 10% level.

Panel A: Active Funds								
	Equal-Weighted Return (% per month)				Value-Weighted Portfolio Return (% per month)			
Security Lending Used	Excess Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha	Excess Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Yes	0.15***	-0.06	-0.14	-0.17*	0.18***	-0.10	-0.12**	-0.16***
	(0.000)	(0.120)	(0.253)	(0.060)	(0.000)	(0.129)	(0.022)	(0.003)
No	0.27***	0.02	-0.06	-0.09*	0.27***	-0.03	-0.05	-0.08*
	(0.000)	(0.826)	(0.200)	(0.086)	(0.000)	(0.559)	(0.350)	(0.088)
Difference Yes-No	-0.12***	-0.08**	-0.07**	-0.08***	-0.10***	-0.07	-0.08**	-0.08*
p-value	(0.000)	(0.011)	(0.017)	(0.008)	(0.000)	(0.112)	(0.049)	(0.056)
Panel B: Index Funds								
	Equal-Weighted Return (% per month)				Value-Weighted Portfolio Return (% per month)			
Security Lending Used	Excess Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha	Excess Return	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Yes	0.13***	0.01	-0.06	-0.04	0.18***	-0.01	0.00	0.02
	(0.000)	(0.910)	(0.227)	(0.408)	(0.000)	(0.825)	(0.973)	(0.511)
No	0.35***	0.08	0.06	0.09*	0.48***	0.02	0.03	0.06
	(0.000)	(0.120)	(0.253)	(0.060)	(0.000)	(0.713)	(0.474)	(0.211)
Difference Yes-No	-0.22***	-0.08*	-0.12***	-0.13***	-0.30***	-0.03	-0.03	-0.03
p-value	(0.000)	(0.074)	(0.004)	(0.001)	(0.010)	(0.405)	(0.234)	(0.235)

Table 4
Fund Performance and Security Lending: Multivariate Regression

This table reports estimates of ordinary least squares and fixed effects regressions of the Carhart 4-factor alphas (in percentage per month) on the security lending used dummy and lagged fund characteristics for active funds (Panel A) and index funds (Panel B). The sample consists of equity mutual funds with N-SAR filings and CRSP mutual funds data over the 1996–2008 period. Refer to Table A.1 in the Appendix for variable definitions. Robust *t*-statistics in parentheses are based on standard errors clustered by fund. ***, **, * denote that the coefficient is significant at the 1%, 5%, and 10% level.

Panel A: Active Funds								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Security Lending Used	-0.061***	-0.057***	-0.040***	-0.043*	-0.059***	-0.055***	-0.036**	-0.071***
	(-4.54)	(-4.40)	(-3.04)	(-1.77)	(-3.97)	(-3.80)	(-2.55)	(-2.59)
Fund Utilization	-0.010***	-0.007**	0.007**	-0.009**	-0.010***	-0.008**	0.005	-0.010**
	(-4.04)	(-2.25)	(2.04)	(-2.18)	(-3.87)	(-2.21)	(1.47)	(-2.30)
Expense Ratio	-0.017	-0.016	-0.013	0.086	-0.016	-0.016	-0.015	0.141**
	(-0.85)	(-0.79)	(-0.65)	(1.54)	(-0.74)	(-0.71)	(-0.66)	(2.25)
ln(TNA)	-0.010**	-0.011**	-0.019***	-0.230***	-0.011**	-0.012**	-0.021***	-0.219***
	(-2.26)	(-2.49)	(-4.32)	(-16.66)	(-2.29)	(-2.45)	(-4.36)	(-14.87)
Net Flow	0.008***	0.008***	0.008***	0.001	0.009***	0.009***	0.008***	0.002
	(5.46)	(5.25)	(5.21)	(0.66)	(5.42)	(5.23)	(5.21)	(0.85)
Turnover	-0.056***	-0.053***	-0.052***	0.014	-0.057***	-0.055***	-0.054***	0.015
	(-5.19)	(-4.72)	(-4.68)	(0.76)	(-4.91)	(-4.60)	(-4.63)	(0.74)
ln(Family TNA)	0.003	0.002	0.005*	0.015	0.007**	0.005*	0.007**	0.028**
	(1.22)	(0.78)	(1.86)	(1.12)	(2.08)	(1.66)	(2.32)	(2.17)
Broker Funds in Family	-0.001***	-0.001***	-0.001***	-0.002**	-0.001***	-0.001***	-0.002***	-0.002**
	(-3.16)	(-3.47)	(-4.20)	(-2.18)	(-3.15)	(-3.40)	(-3.95)	(-2.23)
Constant	0.036				0.009			
	(0.88)				(0.21)			
Style Fixed Effects	No	Yes	Yes	No	No	Yes	Yes	No
Time Fixed Effects	No	No	Yes	No	No	No	Yes	No
Fund Fixed Effects	No	No	No	Yes	No	No	No	Yes
Security Lending Not Allowed Included	Yes	Yes	Yes	Yes	No	No	No	No
Observations	111,487	111,487	111,487	111,487	94,429	94,429	94,429	94,429
R-squared	0.002	0.003	0.094	0.006	0.002	0.003	0.098	0.006

Table 4: continued

Panel B: Index Funds								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Security Lending Used	-0.023	-0.030	-0.017	-0.040	-0.034	-0.038	-0.021	-0.073*
	(-0.96)	(-1.25)	(-0.84)	(-1.03)	(-1.34)	(-1.54)	(-0.98)	(-1.73)
Fund Utilization	-0.004*	-0.002	0.002	0.008	-0.006**	-0.002	0.001	0.005
	(-1.87)	(-0.37)	(0.30)	(0.91)	(-2.33)	(-0.40)	(0.25)	(0.49)
Expense Ratio	-0.134***	-0.144***	-0.141***	-0.381*	-0.111**	-0.119***	-0.126***	-0.347
	(-3.14)	(-3.83)	(-4.11)	(-1.74)	(-2.54)	(-3.10)	(-3.61)	(-1.55)
ln(TNA)	-0.003	-0.001	-0.010	-0.054*	-0.003	-0.002	-0.010	-0.062**
	(-0.36)	(-0.15)	(-1.46)	(-1.83)	(-0.34)	(-0.23)	(-1.47)	(-2.05)
Net Flow	-0.002	-0.003	-0.000	-0.003	-0.003	-0.003	-0.002	-0.003
	(-0.65)	(-0.75)	(-0.15)	(-1.09)	(-0.97)	(-1.06)	(-0.51)	(-0.96)
Turnover	-0.010**	-0.009**	-0.008**	-0.006	-0.011**	-0.010**	-0.008**	-0.007
	(-2.52)	(-2.34)	(-2.21)	(-1.16)	(-2.52)	(-2.36)	(-2.23)	(-1.21)
ln(Family TNA)	-0.009	-0.010	-0.004	-0.064**	-0.002	-0.001	0.001	-0.063**
	(-1.11)	(-0.99)	(-0.49)	(-2.28)	(-0.26)	(-0.18)	(0.16)	(-2.15)
Broker Funds in Family	0.000	-0.000	-0.001	-0.003	0.000	-0.000	-0.000	-0.003
	(0.12)	(-0.06)	(-1.03)	(-1.42)	(0.06)	(-0.31)	(-0.93)	(-1.32)
Constant	0.156				0.074			
	(1.53)				(1.12)			
Style Fixed Effects	No	Yes	Yes	No	No	Yes	Yes	No
Time Fixed Effects	No	No	Yes	No	No	No	Yes	No
Fund Fixed Effects	No	No	No	Yes	No	No	No	Yes
Security Lending Not Allowed Included	Yes	Yes	Yes	Yes	No	No	No	No
Observations	10,547	10,547	10,547	10,547	9,890	9,890	9,890	9,890
R-squared	0.008	0.012	0.127	0.004	0.007	0.012	0.130	0.004

Table 5
Fund Performance and Security Lending: Heckman Selection Model

The table reports estimates of Heckman two-stage selection model of fund performance on security lending. Panel A reports first-stage probit regressions estimates of the fund decision to allow security lending using lagged fund family and fund characteristics as explanatory variables. Panel B reports second-stage regression estimates of the Carhart 4-factor alphas (in percentage per month) on the security lending used dummy and lagged fund characteristics. Lambda is the inverse Mills ratio in the Heckman model. The sample consists of active equity mutual funds with N-SAR filings and CRSP mutual funds data over the 1996–2008 period. Refer to Table A.1 in the Appendix for variable definitions. Robust *t*-statistics in parentheses are based on standard errors clustered by fund. ***, **, * denote that the coefficient is significant at the 1%, 5%, and 10% level.

Panel A: Probit of Security Lending Allowed (First Stage)				
	(1)	(2)	(3)	(4)
Average Family Performance Rank	-0.038***	-0.038***		
	(-3.51)	(-3.49)		
ln(Family TNA)	0.042**	0.042**		
	(2.43)	(2.43)		
Average Family Expense Ratio	0.278**	0.278**		
	(2.50)	(2.49)		
Investment Objective Herfindahl	-0.007***	-0.007***		
	(-5.29)	(-5.29)		
Family Net Flow	-0.005*	-0.005*		
	(-1.73)	(-1.72)		
Average Family Active Share	-0.003	-0.003		
	(-0.89)	(-0.88)		
Index Funds in Family	0.014**	0.014**		
	(2.51)	(2.51)		
Subadvised Funds in Family	-0.005***	-0.005***		
	(-6.15)	(-6.17)		
Broker Funds in Family	-0.002	-0.002		
	(-1.25)	(-1.25)		
Performance Rank			-0.018***	-0.011*
			(-3.00)	(-1.90)
ln(TNA)			0.028	0.030
			(1.23)	(1.32)
ln(Age)			-0.186***	-0.195***
			(-4.80)	(-4.84)
Turnover			0.125**	0.126***
			(2.56)	(2.60)
Active Share			-0.001	-0.000
			(-0.43)	(-0.17)
Observations	115,449	115,449	104,490	104,490

Table 5: continued

Panel B: Regression of 4-Factor Alpha (Second Stage)				
	(1)	(2)	(3)	(4)
Security Lending Used	-0.059***	-0.075***	-0.040**	-0.064**
	(-4.02)	(-2.74)	(-2.51)	(-2.25)
Fund Utilization	-0.008**	-0.009**	-0.005	-0.006
	(-2.29)	(-2.16)	(-1.15)	(-1.25)
Expense Ratio	-0.018	0.123*	-0.031	0.126*
	(-0.79)	(1.95)	(-1.29)	(1.83)
ln(TNA)	-0.012**	-0.224***	-0.024**	-0.229***
	(-2.41)	(-15.28)	(-2.16)	(-12.34)
Net Flow	-0.001***	-0.002**	-0.001***	-0.002**
	(-3.46)	(-2.32)	(-2.98)	(-2.29)
Turnover	0.008***	0.001	0.008***	-0.000
	(5.06)	(0.69)	(4.55)	(-0.03)
ln(Family TNA)	-0.049***	0.008	-0.029	0.002
	(-3.75)	(0.38)	(-1.48)	(0.09)
Broker Funds in Family	0.007*	0.025*	0.012***	0.046***
	(1.80)	(1.89)	(2.99)	(2.93)
Lambda	0.042*	0.049	0.583***	0.656***
	(1.70)	(1.59)	(7.19)	(8.81)
Style Fixed Effects	Yes	No	Yes	No
Fund Fixed Effects	No	Yes	No	Yes
Observations	115,449	115,449	104,490	104,490

Table 6
Fund Performance and Security Lending: Propensity-Score Matched Sample

Panel A reports estimates of probit regression of the fund decision to lend securities using lagged fund and family characteristics as explanatory variables. A control sample of funds is constructed using the fund in the same month and style with the closest propensity score to the treated fund. Panel B reports a comparison of mean fund and family characteristics of treated, non-treated and control fund groups. p-values from a *t*-test of the difference in means is also shown. Panel C reports the difference in Carhart 4-factor alphas (in percentage per month) between the treated and control fund groups. The sample consists of active equity mutual funds with N-SAR filings and CRSP mutual funds data over the 1996–2008 period. Refer to Table A.1 in the Appendix for variable definitions. ***, **, * denote that the coefficient is significant at the 1%, 5%, and 10% level.

Panel A: Probit of Security Lending Used

	Coefficient	t-statistic
Fund Utilization	2.276***	3.09
Expense Ratio	-0.050	-0.59
ln(TNA)	0.041**	2.31
Net Flow	-0.018***	-6.76
Turnover	-0.003	-0.11
Average Family Performance Rank	-0.037***	-2.95
ln(Family TNA)	0.060***	4.05
Average Family Expense Ratio	-0.698	-0.07
Investment Objective Herfindahl	-0.444***	-3.61
Average Family Active Share	-1.838***	-6.65
Index Funds in Family	0.763**	2.22
Subadvised Funds in Family	0.024	0.33
Broker Funds in Family	-0.003**	-2.03
Style Fixed Effects	Yes	
Pseudo R-squared	0.080	
Observations	109,474	

Panel B: Means for Treated, Non-Treated and Control Funds

	Treated	Non-Treated	Difference	p-value	Treated	Control	Difference	p-value
Fund Utilization (%)	3.22	3.06	0.16***	0.000	3.22	3.17	0.05*	0.067
Expense Ratio (%)	1.25	1.34	-0.09***	0.000	1.25	1.25	0.00	0.968
ln(TNA)	6.10	5.55	0.55***	0.000	6.10	6.10	0.00	0.873
Net Flow (%)	0.04	0.63	-0.60***	0.000	0.04	0.11	-0.07**	0.049
Turnover (%)	88.55	91.72	-3.17***	0.000	88.55	91.71	-3.16	0.000
Average Family Performance Rank	1.99	2.02	-0.03***	0.000	1.99	2.00	-0.01**	0.027
ln(Family TNA)	10.73	9.48	1.25***	0.000	10.73	10.80	-0.07***	0.001
Average Family Expense Ratio (%)	1.24	1.34	-0.10***	0.000	1.24	1.25	-0.01***	0.010
Investment Objective Herfindahl	0.26	0.39	-0.13***	0.000	0.26	0.25	0.01***	0.000
Average Family Active Share (%)	75.11	79.34	-4.23***	0.000	75.11	75.12	-0.01	0.841
Index Funds in Family (% total)	6.17	3.56	2.61***	0.000	6.17	5.71	0.46***	0.000
Subadvised Funds in Family (% total)	28.61	25.75	2.86***	0.000	28.61	29.65	-1.04***	0.001
Broker Funds in Family (% total)	28.70	30.34	-1.64***	0.000	28.70	29.32	-0.62***	0.000

Panel C: Mean Abnormal Return

	Treated	Control	Difference	p-value
4-Factor Alpha (% per month)	-0.18	-0.12	-0.06***	0.000

Table 7
Fund Performance and Security Lending: Effect of Investment Restrictions and Affiliated Lending Agents

This table reports estimates of ordinary least squares regressions of the Carhart 4-factor alphas (in percentage per month) on the security lending used dummy and lagged fund characteristics. The sample consists of active equity mutual funds with N-SAR filings and CRSP mutual funds data over the 1996–2008 period. Refer to Table A.1 in the Appendix for variable definitions. Robust *t*-statistics in parentheses are based on standard errors clustered by fund. ***, **, * denote that the coefficient is significant at the 1%, 5%, and 10% level.

	(1)	(2)	(3)
Security Lending Used	0.050	-0.114***	-0.043***
	(1.05)	(-3.35)	(-3.22)
Restriction Index	0.173***		
	(3.06)		
Security Lending Used x Restriction Index	-0.198**		
	(-2.27)		
Options-Futures Allowed		-0.062***	
		(-2.84)	
Security Lending Used x Options-Futures Allowed		0.085**	
		(1.98)	
Affiliated Lending Agent			0.145
			(0.89)
Security Lending Used x Affiliated Lending Agent			-0.112
			(-0.68)
Fund Utilization	-0.007**	-0.007**	0.010***
	(-2.13)	(-2.17)	(3.66)
Expense Ratio	-0.015	-0.014	-0.056***
	(-0.74)	(-0.70)	(-2.65)
ln(TNA)	-0.012***	-0.012***	-0.020***
	(-2.70)	(-2.69)	(-4.67)
Net Flow	0.008***	0.008***	0.002
	(5.25)	(5.22)	(1.60)
Turnover	-0.052***	-0.053***	-0.056***
	(-4.57)	(-4.65)	(-6.31)
ln(Family TNA)	0.002	0.003	0.010***
	(0.75)	(0.94)	(3.88)
Broker Funds in Family	-0.001***	-0.001***	-0.001**
	(-3.65)	(-3.63)	(-2.50)
Style Fixed Effects	Yes	Yes	Yes
Observations	111,487	111,487	89,953
R-squared	0.003	0.003	0.004

Table 8
Security Lending and a Manager Response to Borrowing Demand

This table reports an analysis of a sample of active fund managers who manage two or more funds at the same time in which a fund(s) is allowed to lend securities and the other fund(s) is prohibited. Position Change is the quarterly change in the number of shares held by the fund (as fraction of shares held) around the period in which the stock becomes hard-to-borrow as proxied by below median institutional ownership (limited supply) and top quartile short interest (excess shorting demand). The table also report mean fund characteristics of the two group of funds managed by the same manager. Panel A shows the results for all manager-stock-fund pairs. Panels B and C report statistics for the subsamples where the funds that are allowed to lend do not lend (Panel B) and do lend (Panel C). The sample consists of active equity mutual funds with N-SAR filings and CRSP mutual funds data over the 1996–2008 period. Refer to Table A.1 in the Appendix for variable definitions. ***, **, * denote that the coefficient is significant at the 1%, 5%, and 10% level.

Panel A: Security Lending Allowed vs. Security Lending Prohibited				
	Security Lending Allowed	Security Lending Prohibited	Difference	p-value
Position Change (% shares held)	-3.80	-5.58	1.78*	0.070
Expense Ratio (%)	1.06	1.20	-0.14***	0.000
TNA ($ millions)	1,918	4,355	-2,437***	0.000
Fund Age (years)	12.53	11.51	1.01***	0.000
Net Flow (%)	-0.40	1.71	-2.11***	0.000
Subadvised Fund (% total)	40.73	28.17	12.56***	0.000
Panel B: Security Lending Allowed and Not Used vs. Security Lending Prohibited				
	Security Lending Allowed and Not Used	Security Lending Prohibited	Difference	p-value
Position Change (% shares held)	-4.54	-2.52	-2.02	0.294
Expense Ratio (%)	1.20	1.27	-0.07***	0.000
TNA ($ millions)	2,710	5,393	-2,683***	0.000
Fund Age (years)	16.30	19.62	-3.31***	0.000
Net Flow (%)	0.43	1.09	-0.66	0.285
Subadvised Fund (% total)	29.33	25.15	4.18***	0.003
Panel C: Security Lending Allowed and Used vs. Security Lending Prohibited				
	Security Lending Allowed and Used	Security Lending Prohibited	Difference	p-value
Position Change (% shares held)	-3.53	-6.70	3.17***	0.006
Expense Ratio (%)	1.01	1.17	-0.16***	0.000
TNA ($ millions)	1,627	3,977	-2,350***	0.000
Fund Age (years)	11.15	8.56	2.59***	0.000
Net Flow (%)	-0.74	1.94	-2.69***	0.000
Subadvised Fund (% total)	44.88	29.27	15.62***	0.000

Table 9
Fund Flows and Security Lending

This table report estimates of regressions of monthly fund inflows and outflows on family and fund characteristics. The fund inflow and outflow data come from N-SAR question 28a-f. The independent variables include the lagged fund inflows and outflows (Fund Inflows and Outflows), average inflows and outflows to all funds in the same Morningstar investment objective (Style Inflows and Outflows), average inflows and outflows to all other funds in the fund family (Family Inflows and Outflows), and the fraction of funds in the family that are allowed to lend securities (Security Lending Allowed in Family). The sample consists of active equity mutual funds with N-SAR filings and CRSP mutual funds data from fund families with at least 10 funds across all investment objectives over the 1996–2008 period. Refer to Table A.1 in the Appendix for variable definitions. Robust *t*-statistics in parentheses are based on standard errors clustered by fund. ***, **, * denote that the coefficient is significant at the 1%, 5%, and 10% level.

	(1)	(2)	(3)	(4)
	Fund Inflows		Fund Outflows	
4-Factor Alpha	0.009***	0.009***	-0.004***	-0.004***
	(9.31)	(9.24)	(-4.71)	(-4.79)
Expense Ratio	-0.001	-0.001	0.002	0.002*
	(-0.84)	(-0.83)	(1.64)	(1.68)
ln(TNA)	-0.003***	-0.003***	-0.003***	-0.003***
	(-8.57)	(-8.64)	(-8.11)	(-8.15)
Turnover	0.000	0.000	0.000	0.000
	(1.03)	(0.93)	(0.84)	(0.68)
ln(Family TNA)	0.002***	0.002***	0.001***	0.001***
	(7.02)	(6.32)	(5.41)	(4.90)
Fund Inflows (t-1)	0.579***	0.578***		
	(20.96)	(20.96)		
Fund Outflows (t-1)			0.505***	0.504***
			(11.48)	(11.43)
Style Inflows	0.179***	0.184***		
	(4.88)	(5.00)		
Style Outflows			0.169**	0.178***
			(2.52)	(2.63)
Family Inflows			0.523***	0.212***
			(9.34)	(2.84)
Family Outflows	0.629***	0.392***		
	(10.60)	(3.19)		
Security Lending Allowed in Family		-0.009**		-0.011***
		(-2.41)		(-3.64)
Security Lending Allowed in Family x Family Inflows				0.355***
				(3.56)
Security Lending Allowed in Family x Family Outflows		0.263*		
		(1.80)		
Time Fixed Effects	Yes	Yes	Yes	Yes
Observations	98,941	98,941	98,941	9,8941
R-squared	0.446	0.447	0.353	0.354

Table 10
Fund Performance and Security Lending: Effect of Short-Selling Demand

This table reports estimates of ordinary least squares regressions of the Carhart 4-factor alphas (in percentage per month) on the security lending used dummy and lagged fund characteristics. The low and high fund short interest consist of those funds that are in the bottom three quintiles and top two quintiles of the distribution. The low and high fund utilization consist of those funds that are in the bottom three quintiles and top two quintiles of the distribution. The crisis period is between October 2007 and December 2008. The sample consists of active equity mutual funds with N-SAR filings and CRSP mutual funds data over the 1996-2008 period. Refer to Table A.1 in the Appendix for variable definitions. Robust *t*-statistics in parentheses are based on standard errors clustered by fund. ***, **, * denote that the coefficient is significant at the 1%, 5%, and 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)
	Fund Short Interest		Fund Utilization		Crisis Period	
	Low	High	Low	High	No	Yes
Security Lending Used	-0.065***	-0.036*	-0.065***	-0.038*	-0.058***	-0.010
	(-3.98)	(-1.78)	(-4.02)	(-1.89)	(-4.27)	(-0.32)
Expense Ratio	-0.022	-0.023	-0.016	-0.026	-0.013	-0.143***
	(-0.97)	(-0.81)	(-0.68)	(-0.85)	(-0.69)	(-2.88)
ln(TNA)	-0.006	-0.021***	-0.006	-0.019***	-0.012***	-0.015
	(-1.09)	(-3.12)	(-1.14)	(-2.92)	(-2.60)	(-1.28)
Net Flow	0.009***	0.007***	0.008***	0.008***	0.010***	-0.006
	(3.94)	(2.99)	(3.58)	(3.43)	(5.69)	(-1.57)
Turnover	-0.044***	-0.034*	-0.047***	-0.031*	-0.036***	-0.046
	(-2.77)	(-1.86)	(-3.11)	(-1.78)	(-2.71)	(-1.00)
ln(Family TNA)	0.002	0.007*	0.000	0.007*	0.002	0.003
	(0.59)	(1.72)	(0.12)	(1.84)	(0.78)	(0.40)
Broker Funds in Family	-0.001***	-0.001	-0.001***	-0.001	-0.001***	0.000
	(-3.06)	(-1.50)	(-3.23)	(-1.23)	(-4.16)	(0.21)
Style Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	61,933	60,441	63,089	59,285	104,505	17,869
R-squared	0.003	0.004	0.003	0.004	0.003	0.007

Table 11
Fund Performance and Security Lending: Lending Income and Collateral

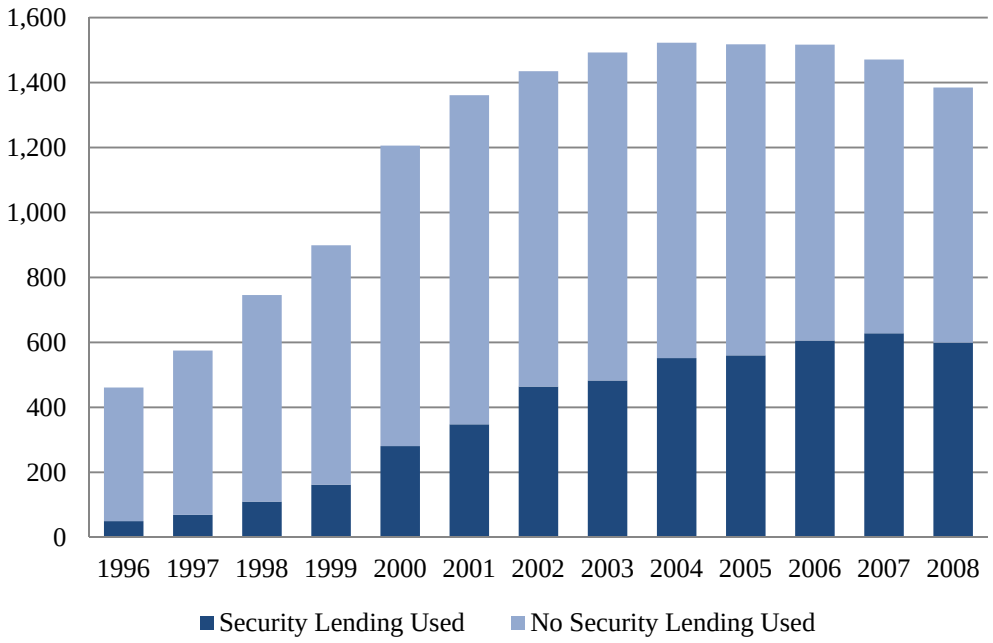
This table reports estimates of ordinary least squares regressions of the Carhart 4-factor alphas (in percentage per month) on security lending income and collateral (as a percentage of total net assets) and lagged fund characteristics. The sample consists of active equity mutual funds with N-SAR filings and CRSP mutual funds data over the 1996-2008 period. Refer to Table A.1 in the Appendix for variable definitions. Robust *t*-statistics in parentheses are based on standard errors clustered by fund. ***, **, * denote that the coefficient is significant at the 1%, 5%, and 10% level.

	(1)	(2)	(3)
Security Lending Income	-0.630***		-1.102***
	(-2.79)		(-3.54)
Security Lending Collateral		0.071	0.400***
		(0.73)	(3.36)
Fund Utilization	0.004	0.011***	0.005
	(1.30)	(3.42)	(1.64)
Expense Ratio	-0.040	-0.056**	-0.045
	(-1.40)	(-2.40)	(-1.52)
ln(TNA)	-0.015***	-0.022***	-0.018***
	(-3.19)	(-4.76)	(-3.59)
Net Flow	0.001	0.003*	0.001
	(0.46)	(1.68)	(0.51)
Turnover	-0.035***	-0.060***	-0.035**
	(-2.82)	(-6.18)	(-2.54)
ln(Family TNA)	0.010***	0.011***	0.010***
	(3.58)	(3.94)	(3.39)
Broker Funds in Family	-0.001	-0.001*	-0.001
	(-1.55)	(-1.72)	(-1.41)
Style Fixed Effect	Yes	Yes	Yes
Observations	67,254	74,587	63,562
R-squared	0.003	0.003	0.003

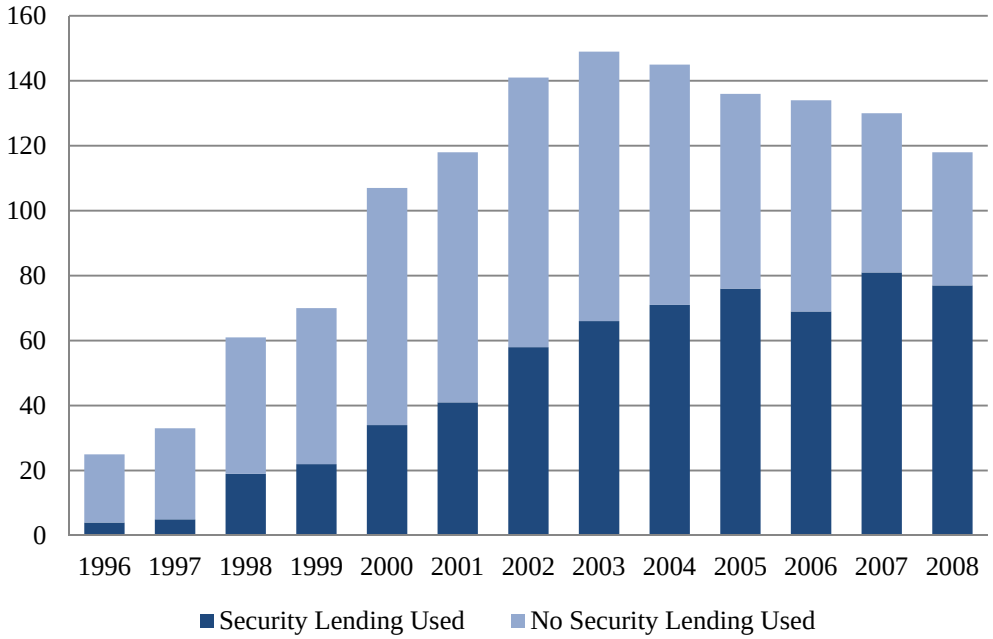
Figure 1
Security Lending Use by Year

This figure reports the number of active funds (Panel A) and index funds (Panel B) that lend their stock holdings and that do not lend their stock holdings by year. The sample consists of equity mutual funds with N-SAR filings and CRSP mutual funds data over the 1996–2008 period.

Panel A: Active Funds



Panel B: Index Funds



Appendix

Table A.1
Variable Definitions

Variable	Definition
Excess Return	Net fund return, in percentage per month, in excess of the U.S. T-bill rate.
CAPM Alpha	Single-factor alpha, in percentage per month, with factor loadings estimated using 36-month of past fund return data.
3-Factor Alpha	Fama and French 3-factor alpha, in percentage per month, with factor loadings estimated using 36-month of past fund return data.
4-Factor Alpha	Carhart 4-factor alpha, in percentage per month, with factor loadings estimated using 36-month of past fund return data.
Security Lending Allowed	Dummy variable that equals one if a fund is allowed to lend shares and zero otherwise (N-SAR form question 70N).
Security Lending Used	Dummy variable that equals one if a fund lends out shares and zero otherwise (N-SAR form question 70N).
Security Lending Income	Security lending income divided by total net assets (NCSR filings).
Security Lending Collateral	Collateral portfolio value divided by total net assets (NCSR filings).
Fund Short Interest	Value-weighted average short interest of fund holdings.
Fund Institutional Ownership	Value-weighted average institutional ownership, as a fraction of market capitalization, of fund holdings.
Fund Utilization	Fund short interest divided by fund institutional ownership.
Expense Ratio	Fund fees and operating expenses, which include 12b-1 fees, as a fraction of total net assets.
TNA	Fund's total net assets in $ millions.
Net Flow	Percentage growth in total net assets, net of internal growth, assuming reinvestment of dividends and distributions.
Turnover	Ratio of aggregated sales or aggregated purchases of securities divided by the average 12-month total net assets of the fund.
Active Share	Active share measure of Cremers and Petajisto (2009).
Performance Rank	Performance rank quintile within investment style using 36-month of past fund returns.
Age	Current date minus the first offer date.
Family TNA	Sum of the total net assets of management company in $ millions.
Average Family Performance Rank	Average of the performance rank of funds in the fund family.
Average Family Expense Ratio	Average expense ratio of funds in the fund family.
Investment Objective Herfindahl	Herfindahl of the Morningstar investment objective of funds in the fund family.
Family Net Flow	Average net flow of funds in the fund family.
Average Family Active Share	Average active share of funds in the fund family.
Index Funds in Family	Percentage of index funds in the fund family.
Subadvised in Family	Percentage of subadvised funds in the fund family.

Broker Funds in Family	Percentage of funds sold through brokers as measured by the presence of a front load, rear load or 12b1 above 0.25% in the fund family.
Security Lending Allowed in Family	Percentage of funds that are allowed to lend securities in the fund family.
Restriction Index	Average of investment restrictions dummy variables aggregated into three categories: restrictions to use leverage (borrowing of money, margin purchases, short selling), restrictions to use derivatives (writing or investing in options on equities, writing or investing in stock index futures), and restrictions to invest in illiquid assets.
Options-Futures Allowed	Average of dummy variables that indicate whether funds are allowed to use of equity options, debt options, index option, interest rate futures, stock futures, option futures, option index futures and commodity futures.
Affiliated Lending Agent	Dummy variable that equals one if a fund uses an affiliated lending agent.

Table A.2
Comparison of CRSP and N-SAR Samples of Mutual Funds

This table compares average fund characteristics by year for the sample of equity mutual funds with N-SAR filings and the sample of equity mutual funds in the CRSP mutual funds database over the 1996–2008 period.

CRSP Sample								N-SAR Sample							
Year	Nr. of Funds	Sum of TNA	TNA	Expense ratio	Turnover	Age	Family TNA	Year	Nr. of Funds	Sum of TNA	TNA	Expense ratio	Turnover	Age	Family TNA
1996	1,469	1,048,482	721	1.34	86.32	7.84		1996	601	634,379	1,068	1.29	79.37	9.09	
1997	1,871	1,545,805	841	1.29	83.98	7.23	177	1997	778	949,078	1,225	1.25	84.13	7.93	
1998	2,418	1,983,934	824	1.30	85.26	6.30	11,616	1998	1,026	1,266,217	1,237	1.27	84.00	6.84	16,991
1999	2,735	2,674,297	978	1.34	95.39	6.20	85,371	1999	1,228	1,826,391	1,487	1.30	97.51	6.77	116,468
2000	3,755	3,670,605	979	1.33	116.56	7.22	97,132	2000	1,726	2,499,170	1,449	1.27	130.39	7.79	130,562
2001	3,817	3,320,615	872	1.37	127.64	7.70	100,483	2001	1,946	2,269,368	1,167	1.33	129.57	7.89	121,416
2002	3,802	2,739,885	722	1.41	128.76	8.10	108,123	2002	2,061	1,705,292	827	1.36	131.05	8.02	124,012
2003	3,777	3,711,034	987	1.42	114.66	8.55	156,417	2003	2,134	2,351,300	1,106	1.38	114.38	8.45	173,861
2004	3,780	4,359,448	1,158	1.33	96.75	8.93	203,956	2004	2,169	2,791,470	1,288	1.32	94.48	8.76	217,626
2005	3,725	4,865,504	1,310	1.29	94.39	9.38	218,368	2005	2,174	3,058,497	1,408	1.26	91.90	9.08	235,053
2006	3,701	5,734,798	1,569	1.26	86.32	9.91	283,537	2006	2,172	3,502,580	1,629	1.22	87.54	9.67	295,273
2007	3,607	6,367,135	1,785	1.21	84.72	10.54	342,101	2007	2,122	3,786,011	1,795	1.17	85.17	10.17	344,913
2008	3,420	3,963,514	1,178	1.17	97.58	11.53	253,423	2008	1,995	2,242,965	1,133	1.14	98.46	11.11	253,540
Total	4,953	3,652,568	1,324	1.26	102.46	9.00	217,886	Total	3,113	2,266,574	1,144	1.31	102.49	9.00	196,574