

# Two Essays on Institutional Investors

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(ABSTRACT)

In the first essay, we study mutual funds' voting on compensation-related proposals initiated by corporate management. Compared with proposals on other topics, proposals on compensation issues are more likely to be challenged by mutual funds. Consistent with active institutional influence, mutual funds are more likely to vote against management at portfolio firms that make more excess CEO pay or depict other symptoms of poor governance such as bad performance and CEO entrenchment. Both active and passive funds' votes are significant drivers of the voting outcome of a proposal. Failed proposals are associated with lower CEO pay, especially excess pay, in the following year. Say-on-pay proposals opposed by more mutual funds are also followed by lower excess CEO pay. Collectively, evidence in this paper suggests that institutions (including passive institutions) play an important role in setting CEO pay through the voting channel.

The second essay examines the equity loan supply for short selling. Using detailed stock lending data, we show that active equity funds, on average, are informed stock lenders. The stocks they lend outperform those that they do not. The stocks they recall and sell perform worse in the future than those that remain on loan. These funds avoid lending stocks when lending fees are extremely high and use the shorting market's signals to form stock-selling decisions. Our findings help explain why institutional investors lend stocks. They also highlight a new source of short-sale constraints arising from the informed loan supply.

# Two Essays on Institutional Investors

Fan Li

(GENERAL AUDIENCE ABSTRACT)

Shareholders of a firm are expected to monitor executive compensation. Among all shareholders, institutional investors such as mutual funds play an important role in setting pay practices for executives. However, do they vote on related proposals at annual meetings or simply “vote by feet”? The first essay strives to answer the question using mutual fund proposal vote records data. Our findings suggest that mutual funds can affect CEO compensation in the future by voting against management-initiated pay proposals and the effect is both statistically and economically significant.

Institutional investors such as mutual funds also participate in lending business on otherwise idle shares in their portfolio. While they are often considered passive and not informed in the equity loan market, their behavior has been much less investigated. We study the extent to which mutual funds exploit information in lending their shares using the first detailed stock lending dataset obtained from SEC filings. We find that mutual funds are informed lenders and important to market efficiency.

# Dedication

*To Holly.*

*To my parents.*

*To my friends and loved ones.*

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# Chapter 1

## Institutional ownership and CEO compensation: The voting channel

### 1.1 Introduction

“Just over half of Oracle’s shareholders voted against the company’s executive pay packages at the company’s November 18 annual meeting. If you take out founder and chairman Larry Ellison’s block vote of 20%, 65% of the tech company’s shareholders voted against the compensation plan. This was the fourth successive time Oracle investors issued a rebuke of the company’s executive pay practices.” — *Why Oracle Shareholders Keep Rejecting The Company’s Executive Pay?*, Fortune, November 25th, 2015 [[Hodgson, 2015](#)]

How does institutional ownership affect executive compensation? Prior literature discovers correlations between institutional ownership and executive compensation, suggesting that institutional shareholders have impacts on executive pay setting [e.g., [Fernandes et al., 2013](#), [Hartzell and Starks, 2003](#)]. However, little work has investigated the mechanism for such effects. In particular, do institutional investors exert influences on executive pay setting directly? On the other hand, prior literature on institutional influence focuses on activist investors [e.g., [Brav et al., 2008](#)], while the role of passive institutional investors in firm moni-

toring is much debated [[Appel et al., 2016](#)]. In this paper, we examine how institutional shareholders, including passive institutions, vote on compensation-related management-initiated proposals and how their votes affect CEO compensation.

The literature on executive compensation suggests that compensation for top corporate executives is driven by both optimal contracting and managerial discretion [e.g., [Core et al., 1999](#)]. In particular, the *skimming view* of executive compensation contends that powerful executives can set their own pay [[Bertrand and Mullainathan, 2001](#)]. Motivated by this view, we focus on management-initiated proposals in this study. Compared with shareholder-initiated proposals, management-initiated compensation proposals are more likely to serve top management's desire to set their own pay. As such, if institutional investors choose to vote against the management on these proposals, they are likely to be making an effort to curb excessive executive pay. Another reason to focus on management proposals is that they occur more often than shareholder proposals. The more frequent occurrence of management proposals than that of shareholder proposals means that management proposals are likely to be more important in shaping corporate policies. In particular, after the Dodd-Frank Act mandates the *say-on-pay* votes in 2010, corporate management is required to submit proposals about executive compensation for shareholder voting periodically. Although such proposals are non-binding in nature, the voting outcome of a proposal reveals the preferences of majority shareholders that management must care about.

Many believe that institutional investors can play an active role in corporate governance of their invested firms. One argument is that the relatively large ownership by institutions, as compared with that by retail investors, implies greater benefits from monitoring [[Shleifer and Vishny, 1986](#)]. Consistent with this argument, prior literature shows that large shareholders such as institutional investors are often associated with higher value of firms [[Ferreira and Matos, 2008](#)]. Another argument is that institutional investors are professional investors who

are likely to have expertise in assessing firms' performance and governance practices.

On the other hand, several factors could mitigate the impact of institutional investors on corporate governance. First, institutional investors' incentive to monitor can be dampened by the cost of free riding by other investors. Second, many institutions such as indexers have relatively small positions in each portfolio firm which constitutes low monitoring incentives. Third, most institutions have only limited personnel devoted to proxy voting and other means of communications with portfolio firms. It is questionable whether a small number of people can give sufficient attention to each individual firm. Passive institutions, in particular, are more likely to suffer from these hindering factors to monitoring than their counterparts pursuing active trading strategies. The counter-argument, however, is that passive institutions tend to follow "best governance practices" in voting, which is a low-cost monitoring model [Black, 1998].<sup>1</sup>

Public media has shown much dissatisfaction toward institutional investors' apparent inactivity in controlling lavish executive pay packages. According to a news article on Opinion FTfm, "Low-cost fund house rarely votes against executive packages" [Marriage, 2017]. The article states that, while Vanguard has done well driving down fees for investors, they are too lenient in their votes on executive pay. A Pensions & Investments article published in March 2018 also laments that large money managers BlackRock and Vanguard Group tend to vote with management on CEO compensation, citing a report from As You Sow, an organization that promotes corporate environmental and social responsibility through shareholder advocacy [Kilroy, 2018]. In this paper, we aim to provide systematic evidence on how institutions vote about executive compensation and the potential impacts of their voting behavior. Among all institutions, we focus on mutual funds who are less likely to

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<sup>1</sup>In a keynote speech at the 2018 Corporate Governance Conference at Drexel University, Robert Main, Head of Vanguard's Portfolio Company Engagement, Analysis and Voting, acknowledged the use of best governance practice after reporting that his team of 30 people voted in over 3,000 portfolio firms in 2017.

be activists and more likely to use the voting channel to exert influences on their portfolio firms.

We start our analysis by examining how mutual funds vote on compensation-related proposals. Executive compensation is an issue that concerns managers directly and, hence, proposals on this topic are likely to be the most contested in the voting process among all proposals. If a compensation-related proposal aims at increasing discretionary pay to top executives without a clear performance base and assuming that institutions act to protect their shareholder value, institutions should vote against such a proposal. We find that mutual funds are more likely to vote against proposals related to executive compensation than other proposals (mostly about director elections). The difference is sizable. We find that compensation proposals are objected to by 15.1% of firms' mutual fund shareholders, compared with 3.2% for non-compensation proposals. When we zero in on passive funds, we find similar results: compensation proposals are objected to by 7.6% of passive fund shareholders while non-compensation proposals are objected to by only 3.2% of passive funds.

How should mutual funds vote in compensation related proposals if they are active owners of their portfolio firms? We hypothesize that mutual funds should vote against management compensation proposals if they discover problems in their portfolio firms' compensation and other governance practices. Consistent with this hypothesis, we find that mutual funds have a greater tendency to vote against the portfolio firm's management on these proposals if the firm's CEO receives more excess pay or if the proposal targets non-incentive pay.<sup>2</sup> We also find similar results when we zero in on passive funds. These results directly support the idea that mutual funds vote to improve executive pay practices. The result on passive funds, in particular, suggests that passive fund are active investors when it comes to executive

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<sup>2</sup>We follow the predictive model in [Core and Guay \[2002\]](#); [Core et al. \[2008\]](#); and [Ertimur et al. \[2011\]](#) to split CEO total pay into pay predicted by economic factors and excess pay. More detail of the procedure is provided in Section [1.4.1](#).

compensation issues.

Mutual funds are also more likely to vote against a firm's management if the firm is less profitable, if the firm's CEO is more entrenched, or if the firm's board is less independent. Because such characteristics are symptoms of poor corporate governance, these results are also consistent with the notion of active institutional investor monitoring. Mutual funds are also more likely to vote against a portfolio firm's management if they have a larger percentage ownership at the firm, presumably because their influence at the firm is greater in this case.

We next investigate whether mutual fund shareholders' voting affects the result of firms' pay-related proposals. Theoretically, institutions' dominant presence in U.S. corporations means they tend to be the majority voting shareholders.<sup>3</sup> However, different institutions may not vote in unison.<sup>4</sup> In the extreme case that half institutional investors vote yes and the other half vote no, the voting outcome will be determined by retail investors including insiders who tend to vote homogeneously. Our results indicate that these confounding factors are not strong enough to negate the importance of institutional investors' votes in proposal outcomes. The more mutual funds vote against the management, the less likely a proposal passes. Interestingly, when we separately examine the fraction of passive institutions voting against management, we find it is also significantly and negatively associated with the probability a proposal passes. The last result suggests that passive fund investors as a group are instrumental in firms' proposal voting outcomes.

We lastly examine whether institutional voting affects executive compensation policies. We hypothesize that institutional investors should oppose higher CEO pay, especially higher

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<sup>3</sup>Based on this argument, prior literature that focuses on how institutional shareholders vote implicitly assumes that institutions' votes drive the voting outcomes [e.g., [Crane, Michenaud, and Weston, 2016](#), [Iliev and Lowry, 2015](#)].

<sup>4</sup>In particular, active institutions can differ greatly from passive institutions in the extent to which they are involved in their portfolio firms' governance. In addition, there seems to be significant divergence in voting within mutual fund families [[Morgan et al., 2011](#)].

excess pay that is not based on economic factors. We examine two channels through which institutional influences are exerted. The first channel is the voting outcome of management-initiated pay proposals that are binding in nature. When a binding management proposal fails to pass, the proposed changes to (increase) executive compensation cannot be implemented. The second channel is shareholder preferences about executive pay revealed in mutual fund votes. This channel is particularly important for say-on-pay votes given their advisory nature.

Thus, we first examine whether failed pay proposals are followed by lower CEO pay. We find that CEO total pay is lower following failed pay-related management proposals. Importantly, when we split CEO total pay into pay predicted by economic factors and excess pay, the above result on CEO total pay is entirely driven by excess pay. The effects are economically large. On average CEO total pay declines by 12.7%, or about \$1.75 million in the year after a pay-related proposal fails to pass. Excess CEO pay decreases by about \$2.21 million and predicted pay increases only by \$22 thousand (statistically insignificant). These results confirm that the voting results of executive-pay-related management proposals have material effects on CEO pay practices and that mutual funds' votes against management successfully reduce CEO excess pay.

We then ask whether mutual funds' votes matter beyond their ability to drive voting outcomes. We find that a higher percentage of mutual funds voting against the management is followed by lower CEO total pay next year. To further understand this presumably implicit channel of institutional investors' influence on CEO pay, we split the sample into say-on-pay (SOP) proposals and non SOP compensation proposals and control for the voting outcome of the proposal. We find that the percentage of mutual fund votes against management is a significant predictor for CEO pay beyond their ability to drive voting outcomes, at least for SOP proposals. We conclude that SOP votes reveal shareholder preferences regarding

executive compensation and that these preferences are considered by corporate boards when determining executive pay.

This paper contributes to our understanding of the effect of institutional investors on executive compensation. Despite earlier evidence of correlations between institutional ownership and executive compensation, a causal effect is still to be established. Recent evidence shows an exogenous change in institutional ownership is followed by changes in some aspects of corporate governance [Appel et al., 2016]. Our paper further explores the channels through which institutional investors influence corporate executive pay setting. By documenting that institutional investors actively make voting decisions to impact CEO pay, we provide evidence that institutional investors have a real impact on executive pay setting. Because we find that passive mutual funds also vote actively in compensation proposals and that their votes are important in driving the proposal voting outcomes, our paper also add to the evidence that passive institutions are active investors and seek to influence corporate governance of their portfolio firms.

Our paper also adds to the growing literature on institutional voting. Most existing papers examine how institutions vote in governance-related proposals (management- or shareholder-initiated) without a specific focus on executive pay issues [e.g., Crane et al., 2016, Davis and Kim, 2007, Matvos and Ostrovsky, 2010]. Relatively little has been done to explore corporate policy outcomes of institutional voting as well. [Ertimur et al., 2011] study 134 vote-no campaigns and 1,198 shareholder proposals related to executive pay in 1997-2007 and find some evidence of CEO pay decreases after institutional proponents submit pay design proposals at firms with excess pay. Butler [2012] study shareholder proposals on compensation and document that mutual funds whose managers are in the same educational network as the firm's CEO are more likely to vote against shareholder proposals. By comparison, our sample includes over 24,000 management proposals related to compensation during 2003-

2015 and we study mutual funds who are not necessarily activists. As such, we are able to draw general conclusions about whether institutional investors exert influences on executive pay setting.

Last but not least, our research contributes to the ongoing debate about the effectiveness of SOP regulation. On one hand, some researchers find SOP votes to have little impact in reducing CEO pay, although they achieve improvements in certain aspects of corporate governance [Conyon and Sadler, 2010, Ferri and Maber, 2012, Iliev and Vitanova, 2019]. Kronlund and Sandy [2018] suggest that greater shareholder scrutiny brought by SOP votes merely leads to more “window-dressing” of compensation. On the other hand, Correa and Lel [2016] find CEO pay growth rates to decline following the adoption of SOP laws around the world. Prior research also has mixed results on whether SOP regulation improves firm value [Cai and Walkling, 2011, Larcker et al., 2011]. In our sample, half of the pay-related proposals are SOP proposals, most of which occur after the enactment of the Dodd-Frank Act in 2010 mandating SOP votes. Our results show that SOP votes cast by institutional investors significantly reduce CEO excess pay and increase incentives in CEO contracts in the U.S.

The paper proceeds as the follows. We first develop a list of testable hypotheses in Section 1.2. Section 1.3 introduces and summarizes the data. Compensation proposals are compared with non-compensation proposals. Section 1.4 examines how mutual funds vote in compensation proposals and validates the measures of the extent to which mutual funds vote against management. Section 1.5 investigates the effects of mutual fund voting in compensation proposals on CEO pay practices. We conclude in Section 1.6.

## 1.2 Hypothesis development

Our testable hypotheses in this paper builds on the idea that institutional investors play an active role in executive pay setting at their portfolio firms. For convenience, we refer to this idea as institutional influence. The first part of our empirical analysis examines how mutual funds vote in compensation-related management proposals. Compared with management proposals on other topics, proposals on executive compensation-related topics are more likely to be contested. This is because executive compensation policies have direct implications on the management’s welfare.<sup>5</sup> Corporate managers have strong incentives to initiate proposals that boost their pay.<sup>6</sup> This notion motivates our first testable hypothesis:

**H1:** Mutual funds are more likely to vote against management in compensation-related management proposals than in management proposals on other topics.

Under the institutional influence hypothesis, existing executive compensation practices should affect how mutual funds vote. High excess CEO pay can reflect managerial rent extraction. Management proposals that target non-incentive pay (e.g, salary and discretionary bonus) are more likely to a tool for managerial rent seeking than those targeting incentive pay (e.g., stock and options). Therefore, we hypothesize the following:

**H2:** Mutual funds are more likely to vote against management in compensation proposals if their portfolio firms make higher excess CEO pay or if the proposal targets non-incentive pay.

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<sup>5</sup>There are almost 400 different general description codes for proposal agenda in the Voting Analytics proposal-level data. We focus on major codes with at least 500 observations (95% of all proposals) and find that they fall into four broad categories: 1) Elect directors (71%), 2) Ratify auditors (11%) 3) Compensation (10%) and 4) Others (3%, including “increase authorized common stock”, “adjourn meeting”, other board-related issues such as “require independent board chairman”, “approve merger agreement”, governance-related issues such as “amend articles/bylaws/charter-non-routine” and “reduce supermajority vote requirement”). To the extent that the non-compensation categories of proposals do not have such direct impacts on executive wealth as compensation proposals, they are less likely to be challenged by investors.

<sup>6</sup>Due to tax and exchange listing rules, firms generally seek shareholder approval for equity compensation plans. We discuss this more in Section 1.3.4.

Institutional influence also implies that institutional investors should be more inclined to engage in contentious voting if their portfolio firms are suffering from governance problems. Indications of governance problems include poor firm performance and poor corporate governance practices. Therefore, we have the following testable hypothesis:

**H3:** Mutual funds are more likely to vote against management in compensation proposals when their portfolio firms have worse performance, more entrenched CEOs, or less independent boards.

The second part of our empirical analysis examines the consequences of institutional investors' voting behavior. Under the institutional influence hypothesis, mutual fund voting in compensation proposals should have material impacts on corporate executive compensation policies. Such impacts can take place through an explicit channel. In this channel, mutual fund voting leads to proposal failure and proposal failure affects compensation policies. To the extent corporate managers strive to increase their pay, failure of a compensation proposal will reduce executive pay. We test the explicit channel in two steps. First, if institutional investors' votes are instrumental in shareholder meetings, they should drive proposal voting results. That is:

**H4:** Mutual fund opposition to management in compensation proposals is significantly and positively related to the likelihood of proposal failure.

Second, failed compensation proposals should have material impacts on executive pay policies. This is because management-initiated proposals (with the exception of SOP proposals) are binding in nature and a failed proposal cannot be implemented. Given that management-initiated compensation proposals are likely intended to boost executive pay, we hypothesize that:

**H5:** Failure of a compensation proposal tends to be followed by lower CEO pay, especially

lower excess CEO pay.

Institutional investors may also exert influence through an implicit channel. In the implicit channel, mutual funds' negative position in compensation-related proposals reflects their dissatisfaction in their portfolio firms' executive pay practices, even if their opposing votes are not sufficient to make the proposals fail. Corporate boards may worry about such sentiment because extreme dissatisfaction can lead to disinvestment, i.e., "mutual funds voting by feet". Hence, they may apply more restraint in granting CEO pay. In view of this implicit effect, we hypothesize that mutual fund opposition to management proposals on executive compensation topics leads to lower CEO pay. That is:

**H6:** The extent of mutual fund opposition to management in compensation proposals is negatively related to future CEO pay, especially excess CEO pay.

The implicit channel of institutional influence is likely to be particularly important for SOP proposals. SOP votes debuted in the United Kingdom in the early 2000s and became mandatory in the United States starting in 2011. SOP regulation mandates advisory votes on firm's overall executive compensation strategy on a regular basis. Despite its non-binding nature, it is especially popular among institutional investors although the literature has mixed results regarding the ability of SOP votes to curb executive compensation. Given their non-binding nature, the explicit channel of institutional influence is likely to be invalid for SOP proposals. Hence, the usefulness of SOP proposals has to rely on the implicit channel.

## 1.3 Data and summary statistics

### 1.3.1 ISS Voting Analytics data

We obtain our main data from the Institutional Shareholder Services (ISS)<sup>7</sup> Voting Analytics database. The database consists of data for all Russell 3K firms at two different levels: the mutual fund voting records data at the fund level and the proposal voting results data at the proposal level.

#### Mutual fund voting data from N-PX filings

Since August 31, 2004, the SEC requires mutual funds and other registered management investment companies to disclose each year how they vote in proxies of the portfolio securities they hold. No later than August 31st of each year, a mutual fund must file with the SEC a report known as Form N-PX, containing the fund’s complete proxy voting record for the most recent 12-month period ended June 30th. Our complete N-PX dataset consists of 82 million voting records of 19,000 individual funds from more than 660 unique fund families from 2003 to 2015. Funds’ votes are recorded in categories “For”, “Against”, “Abstain” or “Withhold”. For ease of interpretation, we follow [Iliev and Lowry \[2015\]](#) to aggregate the latter three votes into “Against”, because “Abstain” and “Withhold” are both likely to reflect investors’ opposition to a proposal. See also [Ashraf et al. \[2012\]](#).<sup>8</sup>

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<sup>7</sup>Formerly known as *RiskMetrics*, a proxy advisory firm that advises institutional investors to vote on proposals on annual meetings.

<sup>8</sup>[Ashraf et al. \[2012\]](#) state that “Fund families could follow an alternative ...strategy of not voting or formally abstaining ...both actions would have a similar connotation of voting against management ...”

### Proposal voting result data for Russell 3K firms

The proposal voting result data<sup>9</sup> covers firms in the Russell 3000 Index, a comprehensive index created by the FTSE to track the entire US stock market performance. The broad index encompasses almost 98% of the publicly traded firms in the US based on market capitalization. Our Russell 3K voting results data records voting results for over 310,000 management-initiated proposals discussed and voted in shareholder meetings from 2003 to 2015. With an exception of SOP frequency proposals, a proposal's voting result can be one of several possibilities: "Pass", "Fail", or "Withdrawn". For SOP frequency proposals, the possible voting results are "One Year", "Two Years", and "Three Years" which indicate the proposed frequency for SOP votes.

For management proposals, in the event of unfavorable feedback during conversations with institutional investors, the management can withdraw them before an actual vote occurs. For example, [Listokin \[2008\]](#) finds an extreme imbalance between the frequency of management proposals narrowly passing (proposals with just over 50% votes) and the frequency of proposals narrowly failing (proposals with just below 50% votes). He argues that the imbalance is consistent with management's ability to lobby shareholders as it observes incoming vote totals (and in most firms, voter identities) during the vote-counting period and to withdraw proposals that appear to be headed for narrow defeats. For this reason, we combine "Fail" and "Withdrawn" as "Fail". The vote result variable also contains values "Pending", "N/A" and "Not Disclosed" (1.51% of the sample collectively) which we drop from the sample for lack of information.

We then join the mutual fund voting records and the proposal level voting results data into one master data file based on a unique proposal identifier, agenda ID. The master file has

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<sup>9</sup>Since 2010, the SEC requires firms to report certain material corporate events including shareholder voting results in Form 8-K instead of Form 10-K and Form 10-Q.

56 million proposal-fund vote observations. For each proposal, we observe the voting result, firm/proposal specific information and details about how each fund votes on that proposal.

We attempt to identify all compensation-related proposals in the data. ISS assigns an item agenda ID (*ISSagendaitemid*) to each proposal. However, to our best knowledge, there is not a publicly available link table that maps each item agenda ID to a unique proposal category. Thus, we rely on another variable: a brief item agenda description that ISS obtain from SEC filings (*AgendaGeneralDesc*). We look up key words related to compensation in *AgendaGeneralDesc*. Such key words include “compensation”, “pay”, “stock plan”, and “bonus plan”. We are able to identify about 5.7 million observations in the master data file pertaining to over 30,000 compensation-related proposals (roughly 10% of all proposals in the data). In Table A.2 of the appendix, we provide a complete list of the item agenda description codes for compensation-related proposals along with their item agenda ID.

From the master data file, we also construct proposal level variables summarizing mutual funds’ votes in each proposal. Specifically, we compute the number of mutual funds voting in the proposal (*n\_funds\_voted*), the number of funds voting against management in the proposal (*n\_funds\_against*), and the percentage of funds voting against management (*pct\_funds\_against*). These variables are essential in later analysis of the consequences of mutual fund voting.

### 1.3.2 Thomson Reuters/CRSP Mutual Fund data

We obtain fund characteristics and holding data from the CRSP mutual fund database and the Thomson Reuters Mutual Fund database.

### ISS voting records and CRSP Mutual Fund Data: fuzzy matching by name

Since there is no unique identifier that links the ISS dataset to the Thomson Reuters mutual fund database, we follow [Matvos and Ostrovsky \[2010\]](#) to achieve the best possible quality of data merging by “fuzzy” matching.

We perform the following steps in an effort to link the datasets. First, we scrape from SEC EDGAR all N-SAR forms filed semi-annually by registered investment companies in our sample period.<sup>10</sup> This generates standardized fund and family names and most importantly, tickers. Second, we join our ISS master file with the “link” file from the first step by fund and family names, i.e., for each fund in the ISS data, we match a unique fund in the link file to it with the lowest *distance* value between both their fund and their family names. In a nutshell, we calculate the *distance* between any given pair of strings by counting the minimum number of edits necessary to transform one into another. For example, “ABC Fund” needs exactly three edits to become “XYZ Fund” and thus the distance between the two fund names is three. We take care to maintain a balance between quality of matching and sample size. As a result, a ticker symbol is available for each matched fund by the end of this step.<sup>11</sup> Third, we match the ISS master file to CRSP Mutual Fund data by ticker and then to the Thomson Reuters mutual fund database through CRSP’s Mutual Fund Links table.

As a result, we are able to match 4,693 mutual funds belonging to 282 fund families during the 2003-2015 sample period (roughly 25-30% of the funds and families in the ISS database<sup>12</sup>).

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<sup>10</sup>Since tickers are only available in the header files starting in late 2005, for pre-2006 period we skip this step and match ISS data with CRSP Mutual Fund database directly via both fund and family names.

<sup>11</sup>Here we use the Optimal String Alignment (OSA) algorithm, i.e., the restricted Damerau-Levenshtein distance, a standard algorithm to calculate the *similarity* between two strings. This OSA method counts the number of edits (deletions, insertions, substitutions and transposition of adjacent characters) necessary to turn one string to another. See <https://cran.r-project.org/web/packages/stringdist/stringdist.pdf> for more detail. For robustness check, alternative methods such as “Cosine” and “q-gram” are also used in unreported tests.

<sup>12</sup>In comparison, [Iliev and Lowry \[2015\]](#) managed to match “2051 unique mutual funds across 234 different

For these funds, we have fund characteristics as well as detailed holding information. Among the 5.7 million proposal-fund vote level observations for pay proposals, we are able to obtain the fund characteristics and holdings data for 410,961 observations.

### **1.3.3 Firm financial, corporate governance, and executive compensation data**

We collect financial data for our sample firms from the Compustat North America database. Information on corporate governance is collected from the ISS. The sample period is 2003-2015. CEO compensation data comes from the Compustat ExecuComp database.

### **1.3.4 Summary statistics**

#### **Proposal distribution**

Table 1.1 reports the year distribution of all management-initiated proposals in our sample, including pay-related and non-pay related proposals. Pay-related proposals include say on pay (SOP) proposals, SOP frequency proposals, and non-SOP proposals. The bottom of the table lists the total number of proposals through all years and the percentages of each type of proposals in total. Noticeably, the number of SOP proposals was nearly zero in early years but surged in 2011, clearly due to the mandatory requirement of SOP votes by the SEC following the passage of the Dodd-Frank Act in 2010. 2011 also witnesses a spike in the number of SOP frequency and non-SOP pay proposals. The former is also prompted by the new regulation which mandates a vote on SOP frequency. The latter is also a likely response to the increased regulatory attention to executive compensation. Overall, there are 298,688

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families over 2006-2010". We did as good, if not better, as them in terms of matching rate in merging the two datasets.

proposals about 11.4% (1-88.6%) of which are pay related. Among pay-related proposals, 37.8% are SOP but not SOP frequency (4.3%/11.4%), 10.0% are SOP frequency proposals (1.1%/11.4%), and 52.2% are non-SOP (6.0%/11.4%). The number of non-pay proposals is relatively stable over the sample compared to pay proposals.<sup>13</sup>

### Proposal characteristics

In Table 1.2, we tabulate the proposal voting results, other proposal characteristics, and mutual fund shareholders' vote positions for all proposals (Panel A) and for a comparison between pay-related proposals and non-pay proposals (Panel B). While the majority of proposals voted on a shareholder meeting pass (96.8%), there remains a fair amount of variation in the proposal outcome. The standard deviation of the Pass (Fail) dummy is 0.176 (0.156), which is not trivial. In most cases, the ISS suggests their clients to vote along with the management team (88.0%). The average threshold of votes a proposal needs to pass is 23.5%. On average, 200 funds vote in a proposal and, among them, 12 funds vote against the management.<sup>14</sup> The average fraction of mutual fund investors voting against management in a proposal is 4.3%.

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<sup>13</sup>While SOP frequency proposals are of compensation nature, they have a different format from other proposals ("One year", "Two years", "Three years") in terms of voting results, we exclude these proposals in most of our analyses except in one test designated for them in Table 1.5. Additionally, a few observations are dropped in the following analyses due to missing values on either vote results or fund voting details.

<sup>14</sup>The number of voting mutual funds has not been systematically discussed in the mutual fund literature. For Russell 3,000 firms which covers almost 98% of the US public firms, the number of voting funds ranges from thousands for firms like Alphabet or Apple to several for the less-known firms. The distribution of the number of voting funds per firm is skewed with a long tail on the left. In a recent paper, [Gillan et al., 2019] show that on average, 682 mutual funds vote on an item at S&P 500 firms, which is consistent with our results given that S&P 500 firms tend to be held and voted by greater numbers of mutual funds.

### **Pay proposals versus non-pay proposals**

There are interesting differences between pay-related proposals and non-pay proposals. Consistent with H1, mutual fund investors are more likely to vote against management (15.1% vs. 3.2%) in pay proposals than in non-pay proposals. This difference is statistically significant at the 1% level. The same result holds for passive funds: 7.6% of passive funds vote against management in pay proposals while only 3.2% of passive funds vote against management in non-pay proposals. The results are consistent with H1. Mutual funds, including passive funds, seem to vote actively when it comes to compensation-related issues that are more likely to reflect managerial discretion than other issues. The ISS is less likely to recommend voting with management (83.9% vs. 88.4%) and the threshold for the proposal to pass is higher (49.9% vs. 20.8%). These results suggest that ISS and corporate boards also deem compensation-related issues potentially debatable and think that they deserve careful consideration.

Overall, the comparisons between pay proposals and non-pay proposals corroborate our conjectures that executive compensation is among the most contentious issues voted in shareholder meetings and that institutional investors make an effort to thwart management's effort to revise their pay (upward).

### **Timing of management-initiated pay proposals**

We next examine the timing of management-initiated pay proposals to shed light on the purposes of these proposals. We find that the vast majority of pay proposals are voted in annual shareholder meetings (30,021 out of 30,581 proposals). The remaining proposals, which consist of less than 2% of the sample, mostly occur in a proxy contest or a special shareholder meeting. An annual shareholder meeting can happen in any month on any day.

When we cross-check the firms' fiscal year end with the date of annual shareholder meetings, we find that the annual shareholder meetings tend to occur four to five months after the fiscal year end. Such an arrangement is reasonable because investors should be given enough time to understand the financial results of a firm before they are asked to vote on firm policies.

Compared with shareholder-initiated proposals, which are relatively sparse, management-initiated proposals are much more frequent. The section 162(m) of the Internal Revenue Code enacted by Congress in 1993 limits the tax deductibility of executive compensation unless approved by shareholders. Besides, stock or option based incentive plans face exchange listing regulations that require shareholder approval to authorize inventories of new shares reserved for future use. Therefore, shareholder approval of compensation plans is regularly sought by firms today [Yermack, 2010].

In practice, executive compensation is often governed by an explicit employment contract between the executive and the firm. Such employment contracts expire after a pre-specified time period and have to be renewed. Renegotiations of contract terms often occur prior to the renewal. When substantial changes in the contract are requested during the renegotiations, shareholder approval must be sought in the form of a management proposal. In a sample of S&P 500 firms, Gillian et al. [2009] find that the median length of a CEO's employment contract is three years. Hence, we check whether the frequency of pay proposals is in line with contract renewal intervals.

Table 1.3 reports the average frequency a proposal occurs in our sample. We separately examine non-SOP proposals and SOP pay proposals because the voting frequency of the latter is determined by the SOP frequency vote instead. As the table shows, non-SOP pay proposals are voted every 2.842 years on average (2.5 years in median). The frequency is similar for pay proposals involving incentive pay. These results are congruent with the conjecture above that firm management tends to put (non-SOP) pay proposals up for voting

when executive contracts are being renegotiated. SOP proposals, which only became popular after 2010, are very frequent and are voted almost every year (average time interval of 1.299 years and median of one year). This is consistent with the voting results of SOP frequency proposals—proposals in which firms use to establish the SOP voting frequency going forward. As the table shows, the SOP voting frequency adopted in these proposals has an average of 1.407 years and a median of one year. In comparison with non-SOP pay proposals, non-pay proposals occur much more frequently; the average time interval is 1.1 years. This result is expected because most of these proposals center on topics of “Elect director” and “Ratify Auditors” which are activities that occur every year.

From this point on, our analyses will be conducted on compensation proposals as they are the focus of the paper.

## 1.4 Mutual fund voting and proposal results

In this section, we first investigate how mutual funds vote on compensation-related management proposals in shareholder meetings and then relate mutual fund voting to the results of these proposals.

### 1.4.1 How do mutual funds vote?

As the first part of our empirical analysis, we examine how mutual fund investors vote in management-initiated proposals in annual shareholder meetings. Table 1.4 presents summary statistics of the key variables used in this analysis.

### How do mutual funds vote on compensation-related proposals?

We investigate how mutual funds vote in a regression framework. In particular, we examine fund and firm characteristics that may be associated with a mutual fund’s tendency to vote with the firm’s management on compensation-related proposals. The regressions include fund size, measured as logarithmic total net assets under management ( $\log(TNA)$ ), fund ownership in firm, and firm financial and governance variables. The fund and firm characteristics are measured at the most recent time point before the proposal voting date (most recent quarter end for fund characteristics and fiscal year end for firm characteristics). We also control for the ISS’s recommendation (*ISS with MGMT*). Following [Iliev and Lowry \[2015\]](#), we include industry fixed effects and year fixed effects and cluster the standard errors by fund in these regressions. The results are presented in [Table 1.5](#).

Controlling for fund size and ISS recommendation, mutual funds with higher ownership in the firm are less likely to vote with management (Column 1). This result is robust to including firm controls (Columns 2-3). Funds with higher ownership in the firm should have a larger chance of actually influencing its pay practices through voting. If mutual funds consciously utilize the voting mechanism to influence executive compensation, we expect them to vote less favorably on management proposals when CEO excess pay is higher (i.e., the first part of H2). To test this prediction, we decompose CEO total pay into excess pay and pay predicted by economic determinants following [Core and Guay \[2002\]](#); [Core et al. \[2008\]](#); and [Ertimur et al. \[2011\]](#). This is achieved by running a regression of CEO total pay on economic determinants of CEO pay such as firm size and performance.<sup>15</sup> The predicted

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<sup>15</sup>The predicted pay is calculated by taking the exponent of the predicted value from regressions of natural logarithm of total CEO pay on an array of economic determinants. More specifically, we estimate  $\ln(CEO_{totalpay})_t = a_0 + a_1 \ln(CEO_{tenure}) + a_2 \ln(Sales_{t-1}) + a_3 S\&P500_{t-1} + a_4 BTM_{t-1} + a_5 Returns_t + a_6 Returns_{t-1} + a_7 ROA_t + a_8 ROA_{t-1} + Industry\ Fixed\ Effects + \epsilon$ , where CEO tenure is the number of years the CEO has been at the position, S&P500 is a dummy that equals 1 if the firm is constituent of the Standard and Poor’s 500 index, BTM is the firm’s book to market ratio calculated by book market equity divided by market value of equity, returns are unadjusted stock returns and ROAs are income before

value from the model is the predicted CEO pay and the residuals are CEO excess pay, i.e., excessive CEO pay not explained by economic factors. We add CEO excess pay (in \$millions) in the fund voting regression and present the results in Column 4 of Table 1.5. Consistent with the prediction, the likelihood for mutual funds to vote with management is significantly and negatively correlated with CEO excess pay.

Some pay proposals target incentive pay such as stock, options, or performance-based bonuses. Such proposals are less likely to be a tool of managerial rent extraction compared with proposals not specifically targeting incentive pay. Institutional influence predicts that mutual funds should be more contesting against management in proposals that do not target incentive pay (i.e., the second part of H2). To test this, we construct a dummy variable “non\_incentive\_dummy” that equals 1 if the proposal’s description is *NOT* about “stock”, “option” or “bonus”.<sup>16</sup> In column 5 of Table 1.5, the results show that funds indeed vote more against management in proposals not targeting incentive compensation.

Consistent with institutional influence, mutual funds are less likely to vote with management if the firms have more entrenched managers or less independent boards. Moreover, mutual funds are more likely to vote against the management if firm performance is worse (measured by lower ROA and higher book-to-market ratio). These results support H3. In Column 5, we also include a dummy variable indicating SOP proposals. We find that SOP proposals receive more support from mutual funds than non-SOP pay proposals. Regarding control variables, funds are more likely to vote with management if they are larger, if the ISS recommends them to do so, or if the firm has a lower financial leverage, or a larger board.

In Column 6, we investigate how passive funds vote. The results are largely in line with those of all mutual funds. Most important, passive funds are less likely to vote with management

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extraordinary items divided total asset. See Table A.1 in the appendix for detailed variable definitions.

<sup>16</sup>See Table A.2 in the appendix for details on how we classify proposal subjects based on item description.

if CEO excess pay is higher, if the proposal targets non-incentive pay, if stock performance is worse (higher book-to-market ratio), or if the board is less independent. The results suggest that passive funds also actively vote in pay-related proposals.

We next turn to SOP and SOP frequency proposals. Column 7 reports the results for SOP (not SOP frequency) proposals. The results are quite similar to those for all pay proposals and continue to support institutional influence and H2-H3. Mutual funds are less likely to vote with management when they own more of a firm and when the firm is more likely to need enhanced monitoring—when CEO excess pay is higher, performance is worse, managers are more entrenched, and board is less independent. Column 8 reports the results for SOP frequency votes. The dependent variable is the proposed SOP frequency that takes the value of 1 (once a year), 2 (once every two years), or 3 (once every three years). Presumably, firm managers would prefer a larger interval (lower frequency) for SOP votes to keep a less tight leash on themselves. Mutual funds are more likely to vote for a smaller SOP interval (higher frequency) at firms whose board is less independent and at firms paying their CEOs more excessively. These results are, again, consistent with the notion of institutional influence that mutual fund investors contend with firm management if the firm has governance problems.

Table 1.6 repeats the baseline specifications in Table 1.5 but includes interaction terms of non-incentive dummy and governance variables. Not surprisingly, we find that conditional on the proposal being related to non-incentive pay, mutual funds vote very differently depending on the quality of corporate governance. If the proposal nature is about non-incentive pay, the more entrenched the firm, the larger the board, the more likely the fund is going to vote against management; the more independent the board is, the more likely the fund is going to vote with the management.

### 1.4.2 Mutual fund voting and proposal result

After establishing that mutual fund investors tend to contend with their portfolio firms' management in executive compensation issues, we next investigate the consequences of mutual fund voting. In this subsection, we construct a firm-level measure of mutual fund opposition to a pay proposal by aggregating mutual funds' voting positions in each proposal and test whether mutual fund voting drives proposal results. This measure will then be used in the next empirical analysis, i.e., how mutual fund voting affects corporate executive compensation policies.

We want to measure the extent to which mutual fund investors vote against management at the firm level. Ideally, if we have the share holdings information for every fund when it votes, we can construct the exact measure of how many shares by mutual fund investors vote against management. Unfortunately, despite our best effort, we are only able to match 30% of the funds in the ISS database with funds in the CRSP Mutual Fund database and Thomson Financial institutions database and obtain their holdings data. For funds we cannot identify holdings, we compute the average holding across all these funds and assign it to each fund. Based on the mutual fund holdings variable constructed above, we define the first measure of mutual fund opposition in a proposal as the total number of shares owned by mutual fund investors voting against management, divided by the number of outstanding shares of the firm (*pct\_shares\_against*). Since the first measure relies on imperfect mutual fund holdings data, we also consider a second measure of mutual fund opposition, *pct\_funds\_against*. This measure is calculated as the number of mutual funds voting against management, divided by the total number of mutual funds voting in the proposal. The two measures of mutual fund opposition are positively correlated (26%).

To test whether mutual funds' voting indeed affects their portfolio firms' proposal outcomes,

we run regression analysis of proposal voting result on the mutual fund opposition measures. Considering that institutional investors have substantial ownership in US public firms, their behavior are likely to drive the voting results for their portfolio firms' management proposals. The regression results are reported in Table 1.7. We conduct both Ordinary Least Squares (OLS) regressions (Columns 1-2) for intuitive comparison of regression coefficients and Logistic regressions (Columns 5-6) for better statistical properties. As expected, the likelihood that a proposal passes is significantly and negatively correlated with *pct\_funds\_against* and *pct\_shares\_against*. Thus, the results in this table confirm that mutual fund voting is an important driver of the voting result of their portfolio firms' management proposals, consistent with H4. To separately assess the importance of passive funds' voting, we also construct a variable, *pct\_passive\_funds\_against*, to capture passive fund opposition. This variable is the fraction of passive funds invested in the firm that vote against management on the proposal. As Column 3 shows, passive fund opposition is significantly and negatively related to the probability that the proposal passes, suggesting that passive funds' voting also has a material impact on proposal results. The result is robust when we add a variable, *pct\_active\_funds\_against*, to control for active fund opposition.<sup>17</sup>

Among the fund-based and share-based measures of mutual fund opposition, Table 1.7 suggests that *pct\_funds\_against* is a stronger predictor of proposal voting result than *pct\_shares\_against*. The OLS coefficient on the former is more than twice as large as that on the latter. Also, the adjusted R<sup>2</sup> is 0.098 when *pct\_funds\_against* is used, compared with 0.003 when *pct\_shares\_against* is used. Hence, we use *pct\_funds\_against* to measure mutual fund opposition in the following analyses of corporate executive compensation policy.

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<sup>17</sup>The correlation between *pct\_passive\_funds\_against* and *pct\_active\_funds\_against* is about 0.64.

## 1.5 Executive compensation

In Section 1.4, we show that mutual fund shareholders tend to vote against management in compensation-related management proposals and that their opposition to these proposals reduces the probability that the proposals pass. In this section, we further investigate the effect of institutional voting on pay proposals on CEO compensation. Evidence that such votes have material impacts on CEO compensation is essential to establish the causal effect of institutional ownership on executive compensation.

### 1.5.1 Effect of failed proposals on CEO compensation

We first examine the effect of a failed pay proposal on next year's CEO total compensation. The analysis is performed at the firm level and the main explanatory variable is a dummy variable indicating that the firm has one (or more) pay proposal that fail to pass (*has\_failed\_pay\_prop*). To ensure fair comparison, we confine our analysis to the set of firm-years that have one or more pay proposals up for voting. We control for firm financial characteristics and corporate governance quality in the analysis to alleviate concerns of omitted variables. Firm fixed effects are included to parse out purely cross-firm differences in compensation and proposal voting results. As such, this analysis focuses on whether and how the failure of a pay proposal is associated with changes in CEO pay. Year fixed effects are included to control for common time trends in the data. The standard errors of estimated coefficients are adjusted by firm level clustering to account for potential serial correlations.

The result reported in Column 1 of Table 1.8, Panel A shows that firms that had a failed pay proposal in a year pay their CEOs about \$1.75 million less in total pay the following year. Using a logarithmic transformation of total pay, Column 2 shows that the effect amounts to an 12.7% (i.e.,  $\exp(-13.6\%)-1$ ) decrease. Such an effect is both statistically and economically

significant. Note that, since our regressions include firm fixed effects and year fixed effects, the result does not reflect a purely cross-sectional association between proposal failure and CEO pay or simple time trends.

If institutional investors use the voting channel to influence CEO pay practices, they should aim to reduce excess pay but not pay that is economically justified. The results in Columns 3-4 of Table 1.8, Panel A confirm our prediction that a failed pay proposal reduces the following year's CEO excess pay but not predicted pay. Excess pay decreases by about \$2.21 million, a magnitude greater than the result on CEO total pay. By comparison, the change in predicted pay is neither statistically nor economically significant. These results are consistent with H5 and in support of the idea that institutional investors play an important role in setting CEO pay.

Next, we include the voting support rate as an additional control variable to implement a tighter regression specification and test the robustness of the above results. Because for a given passage threshold, the voting result depends solely on the support rate, including the support rate in the regressions controls for the possibility that some omitted factors affect both the support rate (and hence the voting result) of the pay proposal and executive compensation policies. This regression specification is essentially a regression discontinuity design: because the voting result depends solely on the support rate, a significant coefficient on the voting result has to come from the difference between the proposal failure and success. For nearly all management-initiated pay related proposals, the passage threshold is half (50%) of the total voting base.<sup>18</sup> Thus, we focus on pay proposals with a passage threshold of 50% and report the regression results in Panel B of Table 1.8. Controlling for the support rate, we continue to find that failed pay proposals are followed by significant decreases in

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<sup>18</sup>The voting base varies from firm to firm. The most common voting base includes "F+A (For + Against)" and "F+A+AB (For + Against + Abstain)". A proposal support rate is calculated as the total shares voting for it over the total voting base.

CEO total compensation (Columns 1-2) and particularly excess CEO pay (Column 3). The support rate is not significantly related to next year's CEO compensation.

We also examine which components of CEO pay are most affected by failed proposals. Table 1.9 presents results from regressions of CEO annual salary, bonus, option awards, and stock grants, in millions of dollars. The table shows that failed compensation proposals are followed by a significant decrease in the amount of option awards while other pay components are largely unaffected. This result is not surprising. Section 162(m) of the Internal Revenue Code limits the tax deductibility of compensation to performance based compensation. Most executive options qualify as performance based and are tax deductible. Hence, granting more options has been a common practice for firms to increase executive pay during the sample period.<sup>19</sup>

Overall, the results in this subsection provide evidence for the explicit channel of institutional influence: institutional investors' votes have a real impact on executive compensation practices when their votes drive proposal results.

### 1.5.2 Does mutual fund opposition matter when proposals pass?

Despite mutual fund investors' opposition, many pay proposals still pass. These proposals are permitted to be executed and will likely boost CEO pay. However, a proposal passed with little institutional opposition may still differ from a proposal passed with strong institutional opposition. Boards care about the preferences of institutional investors revealed in the votes even though the votes do not prevent the passage of the pay proposals. Consistent with this idea, [Ertimur et al. \[2011\]](#) and [Butler \[2012\]](#) show that institutional votes in non-binding shareholder proposals have some impacts on CEO pay. In this case, boards can consciously

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<sup>19</sup>In December 2017, the Tax Cuts and Jobs Act was signed into law, which eliminated the tax deductibility of all compensation in excess of the \$1 million limit for "covered executives".

adjust executive compensation to reassure institutional investors and avoid their “voting by feet”.<sup>20</sup> This is the implicit channel of institutional investors’ influences as stated in H6.

To test this hypothesis, we add a measure of mutual fund opposition to management in pay proposals into the CEO pay regressions. A significant loading on mutual funds’ opposing votes will be consistent with the implicit channel of institutional influence. We use the measure developed in Section 1.4.2: the fraction of mutual fund investors voting against management (*pct\_funds\_against*). The measure is averaged across proposals for the same firm-year when there are multiple proposals in that firm-year. The results are reported in Table 1.10. Stronger mutual fund opposition is followed by lower CEO pay, especially CEO excess pay. These results are suggestive that institutional investors’ opposition affects executive compensation policies and are consistent with H6.

We further check whether institutional investors’ opposition exerts an impact beyond their ability to drive voting outcomes. In this analysis, we separately examine SOP and non-SOP pay proposals. Among management-initiated pay proposals, SOP proposals are advisory in nature while non-SOP proposals are binding. Thus, the results we find about the explicit and implicit channels of institutional voting could differ between SOP and non-SOP pay proposals. We expect the explicit channel to be stronger for non-SOP proposals while the implicit channel would be stronger for SOP proposals, because SOP proposals are advisory and can only influence firm policy through the implicit channel. In Table 1.11, we separate the sample firm-years into those with at least one SOP proposal being voted (Columns 1-4) and those with at least one non-SOP pay proposal voted (Columns 5-8).

As predicted, there are no significant changes in CEO pay following failed SOP proposals, but a greater mutual fund opposition in SOP proposals is followed by lower excess CEO pay.

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<sup>20</sup>For example, Alissa [2015], Carter and Zamora [2009], Conyon and Sadler [2010], and Ferri and Maber [2009] study say-on-pay in the United Kingdom and show that in the aftermath of highly negative votes, firms tend to reduce the size and increase the performance sensitivity of top managers’ pay.

On the other hand, CEO total pay and excess CEO pay decline in the year after non-SOP pay proposals fail to pass. The extent of institutional investor opposition does not have incremental predictive power for CEO pay, however. These results suggest that SOP votes have a significant impact on discretionary executive pay even though such votes are advisory and non-binding in nature.

### 1.5.3 Vote by feet: What happens after unsatisfactory voting results

While our paper primarily focuses on the voting channel, i.e. “Vote by voice”, institutional investors can also use exit as a governance tool, i.e. “Vote by feet”. For example, [Parrino et al. \[2003\]](#) find institutional investors sell their shares prior to forced CEO turnover when dissatisfied with the management. Related, [Edmans et al. \[2011\]](#) also show that the mere threat of exit can serve as a disciplinary method. We have thus far shown that institutional investors employ the “voice” strategy in monitoring executive compensation by actively participating in management-initiated pay proposals. However, our findings do not preclude the possibility that institutional investors could also employ the “vote by feet” strategy after the voting effort proves unsatisfactory. The two strategies are likely to be complementary. Indeed, in a survey [Joseph et al. \[2016\]](#) show that most mutual funds exploit both strategies (voting against management and selling shares) when they are at odds with their portfolio firms.

Following prior literature, we examine changes in the holdings of mutual funds at their portfolio firms after experiencing unsatisfactory voting results at the firms, i.e. passage of pay proposals despite negative votes by the funds. There are 29,404 unsatisfactory voting results to mutual funds in our sample. We find that mutual funds reduce their holdings

in these firms significantly in the next quarter and that the lower holdings persist at least four quarters after the voting. Table 1.12 outlines the inter-quarter transitional changes of the mutual funds' holding at a firm. On average, in a quarter after a pay proposal fails, mutual funds reduce their holding of the firm to 68% of their original position. Over the next three quarters, mutual funds replenish their shares in the firm slightly but keep their holding at around 73% of the pre-voting position. We also check the fraction of funds that increase, decrease, or do not change their holding of the firm passing a pay proposal despite their negative vote. Consistent with the pattern we observe with the retention ratio, about 53.5% funds choose to “vote by feet” right after the voting; and there is no reversal of such actions over the next three quarters, as roughly equal fractions of funds increase or decrease their holding of the firm. Altogether, these results confirm the use of the exit channel of governance after the unsuccessful voting engagement. This result, coupled with the main results on the voting channel, provide a more complete picture of mutual funds' governance endeavours.

Unlike non-SOP pay proposals, SOP proposals do not exert a direct influence on corporate pay practices. Because SOP proposals are nonbinding, a failure to pass does not mandate changes to the proposed compensation plan. In section 1.5.2, we show that for SOP proposals, while greater mutual fund oppositions are associated with lower future CEO excess pay, failing the vote is not. Thus, we next examine the “vote by feet” effect separately for SOP and non-SOP pay proposals. We expect the effect to be stronger for non-SOP pay proposals because for SOP proposals, a fund's decision to divest shares probably does not hinge on the proposal voting results. The result in Panel B of Table 1.12 is consistent with our prediction: by the fourth quarter after an unsatisfactory voting result on an SOP proposal, the holding is 83.2% of its pre-voting level. By contrast, mutual fund holding of firms with non-SOP pay proposal voting results unsatisfactory to the funds declines more and remains low: by

quarter four, the holding is only 62.6% of the pre-voting level.

We also compare mutual funds' holding changes after unsatisfactory voting results between index funds and actively managed funds. Unlike active funds, index funds<sup>21</sup> have limited to no choice on the portfolio to hold and thus are less likely to react to a voting result at a portfolio firm. The result is shown in Panel C of Table 1.12. As expected, the retention ratio is much higher for index funds, with a striking 93.3% after four quarters, while active funds hold only about half of what they had before the voting.

## 1.6 Conclusion

Can institutional investors shape compensation policies of the firms in their portfolios through voting at annual meetings? Although it is widely accepted that institutional ownership affects an array of corporate governance policies, it is not well understood how institutions actually exert such influences. There is also considerable question whether passive institutions actively participate in monitoring. We examine these questions by studying management-initiated proposals on executive compensation-related issues. First, we find that mutual funds are less likely to vote with management in compensation-related proposals than in other types of proposals. Mutual funds are more likely to vote against management if the firm depicts symptoms of poor corporate governance (high excess CEO pay, bad performance, entrenched CEO, less independent board). Passive funds as a group behave similarly to the collective body of all mutual funds. Second, we verify that mutual funds' votes on compensation proposals have a significant impact on the proposal voting results. When we specifically consider passive funds' opposition, we find it to be an important driver

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<sup>21</sup>Following CRSP mutual fund database, index funds include index-based funds, pure index funds and enhanced index funds. Pure index funds are designed to match the total investment performance of a publicly recognized securities market index. Index-based and enhanced index funds are derived from a publicly recognized securities market index but may differ in detailed portfolio choices and weighting schemes.

to proposal results as well, even after controlling for active funds' opposition. Finally, we show that failed compensation proposals are followed by lower CEO excess pay. In addition, although say-on-pay (SOP) proposals are non-binding in nature, mutual funds' votes against management on SOP proposals are still followed by significantly lower CEO excess pay. We conclude that, through voting in pay-related management proposals, institutional investors play an active role in shaping the executive compensation practices at their portfolio firms. Passive institutions are also active monitors.

Our findings help our understanding of the channel through which institutional investors affect executive compensation. In particular, we find that, through voting on compensation-related management-initiated proposals, institutional investors successfully influence the pay practices after the proposal voting. Our results add to the evidence that passive institutional investors are active monitors. Our paper is also related to a growing literature on institutional voting by focusing on management-initiated compensation-related proposals. Finally, our results contribute to the ongoing debate about the effectiveness of SOP legislation.

## 1.7 Tables

Table 1.1: Proposal types breakdown by year

This table reports number of management-initiated proposals by year. Pay-related proposals are as defined in Appendix 1. Say-On-Pay proposals are encoded by the ISS as “M0550”. Say-On-Pay frequency proposals are encoded by the ISS as “M0552”. **Total** sums up number of observations in each category from 2003 to 2015. **Percent** is the fraction of each type of proposals in Total.

Year	Proposal Type				
	All	Pay-related			Non-pay
		SOP	SOP frequency	non-SOP pay	
2003	16,924	0	0	1,084	15,840
2004	17,390	0	0	1,092	16,298
2005	19,105	0	0	1,162	17,943
2006	20,554	0	0	1,116	19,438
2007	19,964	1	0	986	18,977
2008	20,913	8	0	1,106	19,799
2009	22,705	154	0	1,258	21,293
2010	24,163	155	0	1,146	22,862
2011	29,053	2,816	2,751	3,862	19,624
2012	26,147	2,378	224	1,259	22,286
2013	26,715	2,374	186	1,316	22,839
2014	27,410	2,672	125	1,170	23,443
2015	27,645	2,282	121	1,184	24,058
<b>Total</b>	298,688	12,840	3,407	17,741	264,700
<b>Percent</b>	100%	4.3%	1.1%	6.0%	88.6%

Table 1.2: Summary statistics: Proposal characteristics and mutual fund voting

This table reports summary statistics for an array of variables from our ISS Russell 3K voting result and ISS voting records integrated dataset described in section 1.3.1. Say-On-Pay frequency proposals are excluded because of their categorical nature. “**Pass**”, “**Fail**”, “**Withdraw**” and “**ISS with MGMT**” are dummy variable. “**Passage\_threshold**” is the minimum percentage of votes required for a proposal to be passed. “**n\_funds\_voted**” is the number of total funds that have voted on the proposal in our sample. “**n\_funds\_against**” is the number of funds that have voted against on the proposal in our sample. “**pct\_against**” is the ratio of the previous two variables.

<b>Panel A: All proposals</b>								
Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Pass	273,523	0.968	0.176	0	1	1	1	1
Fail	273,523	0.025	0.156	0	0	0	0	1
Withdrawn	273,523	0.007	0.082	0	0	0	0	1
ISS with MGMT	273,523	0.880	0.325	0.000	1.000	1.000	1.000	1.000
Passage_threshold	273,523	0.235	0.246	0.000	0.010	0.010	0.500	0.900
n_funds_voted	273,523	199.586	194.715	1	72	141	257	2,714
n_funds_against	273,523	11.508	58.867	0	0	0	1	2,456
pct_funds_against	273,523	0.043	0.145	0	0	0	0.005	1
n_passive_funds_voted	273,523	22.660	21.195	0	6	17	34	184
pct_passive_funds_against	273,523	0.037	0.165	0	0	0	0	1

  

<b>Panel B: Pay v.s. Non-pay</b>								
Variable	Proposal Type						Differences	
	Pay			Non-pay			Mean	t-statistics
	N	mean	sd	N	mean	sd		
Pass	25,308	0.982	0.132	248,215	0.967	0.179	0.015	17.07
Fail	25,308	0.017	0.127	248,215	0.026	0.159	-0.009	-11.14
Withdrawn	25,308	0.001	0.038	248,215	0.007	0.085	-0.006	-20.21
ISS with MGMT	25,308	0.839	0.367	248,215	0.884	0.320	-0.045	-18.80
Passage_threshold	25,308	0.499	0.018	248,215	0.208	0.243	0.291	582.14
n_funds_voted	25,308	202.493	172.034	248,215	199.289	196.879	3.207	2.78
n_funds_against	25,308	23.855	51.755	248,215	10.249	59.401	13.606	39.27
pct_funds_against	25,308	0.151	0.227	248,215	0.032	0.129	0.119	81.92
n_passive_funds_voted	25,308	26.09	20.261	248,215	22.280	21.265	3.809	30.73
pct_passive_funds_against	25,308	0.076	0.230	248,215	0.032	0.155	0.044	31.608

Table 1.3: Proposal frequency

This table presents the average frequency of different types of management proposals. For each firm in our Russell 3K sample, we calculate the average time gap between two consecutive proposals of the same type. Then we take its average across all firms. Number of years are reported. **Non-SOP Pay** are pay proposals defined in Table A.2 of the appendix excluding Say-On-Pay proposals. **Incentive Pay** are pay proposals that are only related to stock and option plans as defined in Table A.2 of the appendix. **SOP** are Say-On-Pay proposals encoded as "M0550". **Proposed SOP frequency** is the voting result of SOP frequency proposals in number of years. **Non-Pay** are proposals not identified as pay proposals.

Proposal Type	N	Mean	St. Dev.	Min	Pct(25)	Median	Pct(75)	Max
Non-SOP Pay	2,826	2.842	1.589	1.000	1.833	2.500	3.500	12.000
Incentive Pay	2,810	2.858	1.599	1.000	1.833	2.500	3.500	12.000
SOP	2,952	1.299	0.694	1.000	1.000	1.000	1.000	6.000
Proposed SOP frequency	3,381	1.407	0.801	1.000	1.000	1.000	1.000	3.000
Non-Pay	4,847	1.100	0.393	1.000	1.000	1.000	1.000	11.000

Table 1.4: Summary statistics

This table presents summary statistics for each variable in our analysis of how mutual funds vote on pay proposals. The three panels are the whole pay proposal sample, the SOP subsample and the SOP frequency subsample respectively. Refer to Table A.1 in the appendix for variable definitions.

**Panel A: Pay proposal sample**

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Fund votes with MGMT	410,968	0.861	0.346	0	1.000	1.000	1.000	1.000
TNA (\$ million)	410,968	6,641.627	27,184.220	0.097	137.213	612.850	2,630.421	534,783.700
Ownership by fund	410,968	0.002	0.005	0.000	0.00004	0.0002	0.001	0.126
Assets Total (\$ million)	410,921	19,300.720	50,619.270	21.224	1,621.277	4,657.828	15,469.000	751,216.000
ROA	410,549	0.159	0.081	-0.983	0.108	0.147	0.196	1.274
BM	407,884	0.454	0.277	0.001	0.262	0.401	0.597	13.112
Leverage	410,422	0.205	0.144	0.000	0.096	0.193	0.294	1.122
EINDEX	340,472	3.046	1.401	0.000	2.000	3.000	4.000	6.000
Board size	341,184	9.968	2.172	4.000	8.000	10.000	11.000	20.000
Independent director ratio	341,158	0.809	0.100	0.000	0.750	0.833	0.889	1.000
Excess pay (\$ million)	315,436	1.457	6.825	-23.615	-0.790	0.652	2.642	78.649
Non-incentive dummy	410,968	0.608	0.488	0	0	1.000	1.000	1.000
ISS with MGMT	410,961	0.865	0.341	0.000	1.000	1.000	1.000	1.000

**Panel B: SOP subsample**

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Fund votes with MGMT	134,716	0.909	0.288	0	1	1	1	1
TNA (\$ million)	134,716	8,253.712	32,345.380	0.097	144.238	685.660	3,139.380	534,783.700
Ownership by fund	134,716	0.002	0.005	0.000	0.00003	0.0002	0.001	0.114
Assets Total (\$ million)	134,716	25,195.780	60,479.060	94	2,048.7	5,993.3	22,653.9	751,216
ROA	134,716	0.163	0.079	-0.362	0.114	0.148	0.198	1.131
BM	134,716	0.443	0.249	0.001	0.266	0.400	0.582	2.165
Leverage	134,716	0.200	0.132	0.000	0.100	0.191	0.288	0.781
EINDEX	134,716	3.000	1.359	0	2	3	4	6
Board size	134,716	9.990	2.184	4	9	10	11	20
Independent director ratio	134,716	0.816	0.098	0.429	0.750	0.846	0.900	1.000
Excess pay (\$ million)	134,716	1.225	6.148	-23.615	-0.730	0.701	2.695	78.649
Non-incentive dummy	134,716	1.000	0.000	1	1	1	1	1
ISS with MGMT	134,716	0.897	0.304	0	1	1	1	1

**Panel C: SOP frequency subsample**

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
Fund votes with MGMT	32,552	0.688	0.463	0	0	1	1	1
TNA (\$ million)	32,552	3,923.178	15,381.590	1.062	102.462	438.250	1,902.402	322,089.200
Ownership by fund	32,552	0.001	0.004	0.000	0.00002	0.0001	0.001	0.114
Assets Total (\$ million)	32,552	24,134.670	62,241.530	94	1,923.1	5,986	22,128	751,216
ROA	32,552	0.165	0.085	-0.362	0.117	0.148	0.203	0.992
BM	32,552	0.449	0.235	0.006	0.274	0.412	0.597	1.668
Leverage	32,552	0.190	0.129	0.000	0.094	0.184	0.272	0.753
EINDEX	32,552	3.121	1.437	0	2	3	4	6
Board size	32,552	10.021	2.268	4	8	10	12	17
Independent director ratio	32,552	0.811	0.098	0.455	0.750	0.833	0.889	1.000
Excess pay (\$ million)	32,552	1.459	6.481	-19.853	-0.854	0.610	2.587	65.585
ISS with MGMT	32,552	0.685	0.465	0	0	1	1	1

Table 1.5: How do mutual funds vote on compensation proposals?

In this table, we present results regarding the determinants of mutual fund voting on compensation related proposals. Column 1-4 are all pay related proposals and Column 5-6 are subsamples focusing on Say-On-Pay proposals. For all columns except for the last one, we estimate logistic model with dependent variable being a dummy that equals 1 if the fund votes with the management recommendation on the ballot. For the last column, the dependent variable is the actual SOP frequency voted by the fund. The variable has values of 1, 2 and 3 years, which correspond to having Say-On-Pay proposals to be voted *every One Year, Two Years and Three Years*. **log(TNA)** is the logarithm of the fund's total net assets under management. **Ownership by fund** is the market value of the fund's holding in the underlying firm as a fraction of the firm's equity. **log(AT)** is the logarithm of the firm's total assets. **ROA** is the return on asset ratio of the firm. **BM** is the firm's book-to-market ratio. **Leverage** is the firm's market leverage. **IO fraction** is the firm's institutional ownership as a fraction of its market value. **EINDEX** is an anti-takeover measure in [Bebchuk et al. \[2008\]](#). **Board size** is the number of total directors on the board. **Independent director ratio** is the ratio of independent directors over **Board size**. **Excess pay (\$ million)** is the part of compensation estimated using [Core and Guay \[2002\]](#) (in millions). See Section 1.5 for details. **ISS with MGMT** is a dummy that equals 1 if Institutional Shareholder Services also recommends voting with management. **non\_incentive\_dummy** is a dummy variable that equals 1 if the proposal description does not have key words such as "stoc", "option" or "bonus". For logistic models, AMEs (Average Marginal Effect) are reported with standard errors in parentheses. Year and industry fixed effects are also included in each regression. Fund clustered standard errors are reported.

	<i>Dependent variable:</i>							
	Fundvote with mgmt					FundVote frequency		
	<i>logistic</i>					<i>OLS</i>		
	ALL PAY			PASSIVE	SOP	SOP FREQ		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(TNA)	0.005*** (0.0003)	0.005*** (0.0002)	0.005*** (0.0004)	0.005*** (0.0004)	0.005*** (0.0004)	0.003*** (0.0003)	0.009*** (0.0003)	-0.003*** (0.0002)
Ownership by fund	-0.546*** (0.102)	-0.395*** (0.104)	-0.458*** (0.113)	-0.405*** (0.121)	-0.572*** (0.119)	0.408*** (0.164)	-0.600*** (0.128)	0.776*** (0.123)
log(AT)		0.002*** (0.0004)	-0.0001 (0.0005)	0.0003 (0.0006)	-0.0004 (0.0006)	0.002*** (0.0006)	-0.0005 (0.0005)	0.003*** (0.0006)
ROA		0.024** (0.008)	0.012 (0.008)	0.014 (0.009)	0.016* (0.009)	0.009 (0.008)	0.001 (0.008)	-0.030*** (0.009)
BM		-0.012*** (0.002)	-0.018*** (0.003)	-0.021*** (0.003)	-0.024*** (0.003)	-0.013*** (0.003)	-0.033*** (0.002)	0.010*** (0.003)
Leverage		-0.027*** (0.0004)	-0.027*** (0.005)	-0.028*** (0.006)	-0.025*** (0.006)	-0.040*** (0.005)	-0.012*** (0.004)	-0.018*** (0.006)
EINDEX			-0.001* (0.0004)	-0.0004 (0.0005)	-0.001 (0.001)	-0.0003 (0.0005)	-0.002** (0.0004)	-0.0001 (0.0004)
Board size			0.001** (0.0003)	0.001*** (0.0004)	0.002*** (0.0004)	0.001*** (0.0004)	0.007** (0.0003)	0.0005 (0.0004)
Independent director ratio			0.020*** (0.006)	0.005 (0.007)	0.008 (0.006)	0.035*** (0.006)	0.010* (0.006)	0.038*** (0.007)
Excess pay (\$million)				-0.001*** (0.0001)	-0.001*** (0.0001)	-0.002*** (0.0001)	-0.001*** (0.0001)	-0.0003*** (0.0001)
Non-incentive dummy					-0.079*** (0.005)	-0.12*** (0.002)		
SOP dummy					0.090*** (0.005)	0.192*** (0.002)		
ISS with MGMT	0.529*** (0.005)	0.526*** (0.005)	0.515*** (0.012)	0.509*** (0.014)	0.464*** (0.014)	0.120*** (0.004)	0.462*** (0.005)	-0.015*** (0.001)
MacFadden R <sup>2</sup>	0.28	0.29	0.29	0.30	0.30	0.33	0.31	
Observations	410,961	407,006	334,569	286,485	286,485	81,046	134,994	32,552
R <sup>2</sup>								0.045
Adjusted R <sup>2</sup>								0.038
Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES

Note:

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

Table 1.6: How do mutual funds vote on compensation proposals? Governance reaction to non-incentive pay

In this table, we present results regarding the determinants of mutual fund voting on compensation related proposals. Governance variables interaction terms are included. **Ownership by fund** is the market value of the fund's holding in the underlying firm as a fraction of the firm's equity. **log(AT)** is the logarithm of the firm's total assets. **ROA** is the return on asset ratio of the firm. **BM** is the firm's book-to-market ratio. **Leverage** is the firm's market leverage. **IO fraction** is the firm's institutional ownership as a fraction of its market value. **EINDEX** is an anti-takeover measure in [Bebchuk et al. \[2008\]](#). **Board size** is the number of total directors on the board. **Independent director ratio** is the ratio of independent directors over **Board size**. **Excess pay (\$ million)** is the part of compensation cannot be justified by firm performance estimated using [Core and Guay \[2002\]](#) (in millions). **Predicted pay**, on the contrary, is the part of compensation totally explained by firm performance. See Section 1.5 for details. **ISS with MGMT** is a dummy that equals 1 if Institutional Shareholder Services also recommends voting with management. **non\_incentive\_dummy** is a dummy variable that equals 1 if the proposal description does not have key words such as "stcok", "option" or "bonus". For logistic models, AMEs (Average Marginal Effect) are reported with standard errors in parentheses. Year and industry fixed effects are also included in each regression. Fund clustered standard errors are reported.

	<i>Dependent variable:</i>		
	Fundvote_with_mgmt		
	(1)	(2)	(3)
log(TNA)	0.005*** (0.0004)	0.005*** (0.0004)	0.005*** (0.0004)
Ownership by fund	-0.397*** (0.117)	-0.397*** (0.117)	-0.397*** (0.117)
log(AT)	0.0004 (0.0006)	0.0006 (0.0005)	0.0006 (0.0006)
ROA	0.016* (0.009)	0.016* (0.009)	0.016* (0.009)
BM	-0.023*** (0.003)	-0.022*** (0.003)	-0.023*** (0.003)
Leverage	-0.028*** (0.006)	-0.028*** (0.006)	-0.028*** (0.006)
IO fraction	0.020*** (0.005)	0.021*** (0.005)	0.020*** (0.005)
Board size	0.002** (0.0003)	0.004*** (0.0004)	0.002** (0.0004)
Independent director ratio	0.004 (0.006)	0.006 (0.006)	-0.002 (0.010)
Excess pay (\$million)	-0.001*** (0.0001)	-0.001*** (0.0001)	-0.001*** (0.0001)
Non-incentive dummy	-0.067*** (0.005)	-0.053*** (0.006)	-0.085*** (0.009)
EINDEX	0.002*** (0.0007)	-0.0007 (0.0005)	-0.0006 (0.0004)
SOP dummy	0.089*** (0.006)	0.089*** (0.006)	0.089*** (0.006)
ISS with MGMT	0.463*** (0.016)	0.462*** (0.016)	0.463*** (0.016)
Non-incentive dummy:EINDEX	-0.004*** (0.001)		
Non-incentive dummy:Board size		-0.003*** (0.0005)	
Non-incentive dummy:Independent director ratio			0.009*** (0.010)
FE	YES	YES	YES
McFadden $R^2$	0.30	0.30	0.30
Observations	286,485	286,485	286,485

Note:

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

Table 1.7: Measures of mutual fund opposition to management in compensation proposals

This table presents the relation between mutual fund opposition to management and the compensation proposal voting result. **Vote Result** is a dummy variable that equals 1 if the result is "Pass" and 0 otherwise. **pct\_funds\_against** is the ratio of the number of funds voting against management over the total number of funds involved in the proposal. **pct\_shares\_against** is the holding-based opposition measure calculated as the total number of shares owned by mutual fund investors voting against management, divided by the number of outstanding shares of the firm. Firm clustered standard errors are reported.

	<i>Dependent variable:</i>					
	Vote Result (= 1 if passed, 0 otherwise)			<i>logistic</i>		
	<i>OLS</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
pct_funds_against	-0.183*** (0.003)				-5.904*** (0.180)	
pct_shares_against		-0.074*** (0.009)				-1.896*** (0.260)
pct_passive_funds_against			-0.138*** (0.003)			-0.051*** (0.004)
pct_active_funds_against						-0.144*** (0.004)
Constant	1.010*** (0.001)	0.984*** (0.001)	0.995*** (0.001)	1.010*** (0.001)	6.304*** (0.126)	4.097*** (0.054)
Observations	25,308	21,248	24,228	24,216	25,308	21,248
R <sup>2</sup>	0.098	0.003	0.069	0.097		
Adjusted R <sup>2</sup>	0.098	0.003	0.069	0.097		
Pseudo R <sup>2</sup>					0.32	0.19
Residual Std. Error	0.126 (df = 25306)	0.130 (df = 21246)	0.125(df = 24227)	0.123(df = 24214)		

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Table 1.8: Failed pay related proposals and CEO compensation level

In Table 1.8, we present the effect of failed pay related proposal on subsequent CEO compensation. **CEO total compensation** is the CEO's total pay from ExecuComp in year  $t+1$ . **Excess pay (\$ million)** is the part of compensation cannot be justified by firm performance estimated using [Core and Guay \[2002\]](#) (in millions). **Predicted pay**, on the contrary, is the part of compensation totally explained by firm performance. See Section 1.5 for details. **has\_failed\_pay\_prop** is a dummy variable that equals 1 if a firm has a failed pay proposal in year  $t$ . **log(AT)** is the logarithm of the firm's total assets. **Ret** is the annual return in year  $t$ . **ROA** is the return on asset ratio of the firm. **BM** is the firm's book-to-market ratio. **Leverage** is the firm's market leverage. **IO fraction** is the firm's institutional ownership as a fraction of its market value. **EINDEX** is an anti-takeover measure in [Bebchuk et al. \[2008\]](#). **Board size** is the number of total directors on the board. **Independent director ratio** is the ratio of independent directors over **Board size**. **Director tenure** is the average years that directors has served on board. **Has female on board** is a dummy variable that equals 1 if there is at least one female serving on board. **Director ownership** is the average director holding in the firm. **Support rate** is the average fraction of "For" voting shares for the firm-year. Year and firm fixed effects are also included in each regression. Firm clustered standard errors are reported.

Panel A: CEO compensation v.s. Only Vote Result

	<i>Dependent variable:</i>			
	CEO total compensation <sub>t+1</sub>	Ln(1 + CEO total compensation) <sub>t+1</sub>	Excess pay <sub>t+1</sub>	Predicted Pay <sub>t+1</sub>
	(1)	(2)	(3)	(4)
has_failed_pay_prop	-1,752.699*** (470.068)	-0.136*** (0.053)	-2,214.885*** (536.534)	21.671 (84.871)
log(AT)	1,284.642*** (250.372)	0.237*** (0.028)	-322.444 (291.003)	1,544.494*** (46.032)
Ret	981.091*** (179.430)	0.141*** (0.020)	751.129*** (205.720)	280.309*** (32.542)
ROA	1,746.567** (808.551)	0.298*** (0.090)	1,312.275 (917.801)	508.748*** (145.182)
BM	200.778 (8,744.686)	-3.308*** (0.977)	4,663.157 (9,745.848)	-3,329.073** (1,541.641)
Leverage	-1.371 (2.075)	-0.0001 (0.0002)	-0.185 (2.240)	-0.769** (0.354)
IO fraction	-838.870 (927.309)	-0.008 (0.104)	612.409 (1,069.237)	-939.071*** (169.137)
EINDEX	21.249 (106.135)	0.002 (0.012)	72.675 (122.640)	-24.679 (19.400)
Independent director ratio	955.643 (1,088.784)	0.264** (0.122)	650.905 (1,255.098)	363.525* (198.537)
Board size	136.760** (69.278)	0.005 (0.008)	154.847* (80.400)	17.640 (12.718)
Has female on board	-222.456 (286.319)	-0.019 (0.032)	-234.853 (325.742)	-75.961 (51.527)
Director tenure	24.467 (20.868)	0.003 (0.002)	101.561** (43.295)	11.978* (6.849)
log(Director ownership)	46.164 (107.471)	-0.036*** (0.012)	33.777 (127.884)	-15.549 (20.229)
Observations	5,900	5,900	5,026	5,026
R <sup>2</sup>	0.744	0.812	0.528	0.981
Adjusted R <sup>2</sup>	0.671	0.759	0.399	0.976
Residual Std. Error	4,179.046 (df = 4599)	0.467 (df = 4599)	4,451.492 (df = 3941)	704.156 (df = 3941)
Firm Year FE	YES	YES	YES	YES

Note:

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

Panel B: CEO Compensation v.s. Vote Result + Support Rate

	<i>Dependent variable:</i>			
	CEO total compensation <sub>t+1</sub>	Ln(1 + CEO total compensation) <sub>t+1</sub>	Excess pay <sub>t+1</sub>	Predicted Pay <sub>t+1</sub>
	(1)	(2)	(3)	(4)
has_failed_pay_prop	-1,651.260*** (555.607)	-0.119* (0.062)	-1,800.168*** (632.726)	-22.961 (100.126)
log(AT)	1,295.494*** (253.023)	0.238*** (0.028)	-306.110 (294.389)	1,542.967*** (46.586)
Ret	975.575*** (180.385)	0.139*** (0.020)	746.780*** (206.860)	281.223*** (32.735)
ROA	1,721.770** (814.651)	0.295*** (0.091)	1,235.687 (924.126)	509.271*** (146.238)
BM	543.613 (8,876.655)	-3.270*** (0.990)	5,840.676 (9,902.404)	-3,593.084** (1,567.005)
Leverage	-1.353 (2.079)	-0.0001 (0.0002)	-0.118 (2.244)	-0.778** (0.355)
IO fraction	-858.220 (935.405)	-0.016 (0.104)	674.598 (1,079.498)	-966.232*** (170.825)
EINDEX	24.868 (107.115)	0.003 (0.012)	78.105 (123.795)	-23.946 (19.590)
Independent director ratio	981.731 (1,095.741)	0.267** (0.122)	641.328 (1,262.612)	373.400* (199.802)
Board size	135.485* (69.593)	0.005 (0.008)	156.649* (80.789)	16.855 (12.784)
Has female on board	-215.685 (287.795)	-0.020 (0.032)	-229.080 (327.550)	-74.774 (51.833)
Director tenure	24.324 (20.969)	0.003 (0.002)	104.254** (43.873)	10.759 (6.943)
log(Director ownership)	44.797 (108.245)	-0.036*** (0.012)	26.118 (128.863)	-12.597 (20.392)
Support rate	407.484 (719.951)	0.071 (0.080)	1,263.640 (822.260)	-126.097 (130.118)
Observations	5,900	5,900	5,026	5,026
R <sup>2</sup>	0.744	0.813	0.528	0.981
Adjusted R <sup>2</sup>	0.671	0.760	0.398	0.976
Residual Std. Error	4,187.090 (df = 4598)	0.467 (df = 4598)	4,459.254 (df = 3940)	705.654 (df = 3940)
Firm Year FE	YES	YES	YES	YES

Note:

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

Table 1.9: Failed pay related proposals and CEO compensation structure

In Table 1.9, we present the effect of failed pay related proposal on subsequent structure of CEO compensation. **Salary** is the dollar value of the base salary earned by the named executive officer during the fiscal year (in thousands). **Bonus** is the dollar value of a bonus earned by the named executive officer during fiscal year (in thousands). **Option awards** is the value of option-related awards (e.g. options, stock appreciation rights, and other instruments with option-like features). **Stock awards** is value of stock-related awards (e.g. restricted stock, restricted stock units, phantom stock, phantom stock units, common stock equivalent units etc.) that do not have option-like features. **has\_failed\_pay\_prop** is a dummy variable that equals 1 if a firm has a failed pay proposal in year  $t$ . **log(AT)** is the logarithm of the firm's total assets. **Ret** is the annual return in year  $t$ . **ROA** is the return on asset ratio of the firm. **BM** is the firm's book-to-market ratio. **Leverage** is the firm's market leverage. **IO fraction** is the firm's institutional ownership as a fraction of its market value. **EINDEX** is an anti-takeover measure in [Bebchuk et al. \[2008\]](#). **Board size** is the number of total directors on the board. **Independent director ratio** is the ratio of independent directors over **Board size**. **tenure** is the average years that directors has served on board. **hasfemale** is a dummy variable that equals 1 if there is at least one female serving on board. **directorownership** is the average director holding in the firm. Year and firm fixed effects are also included in each regression. Firm clustered standard errors are reported.

	<i>Dependent variable:</i>			
	SALARY <sub>t+1</sub>	BONUS <sub>t+1</sub>	OPTION AWARDS <sub>t+1</sub>	STOCK AWARDS <sub>t+1</sub>
	(1)	(2)	(3)	(4)
has_failed_pay_prop	-27.422 (17.089)	-34.263 (137.559)	-1,353.772*** (223.905)	88.802 (335.173)
log(AT)	106.194*** (9.102)	-7.923 (73.268)	545.572*** (129.565)	780.534*** (193.952)
Ret	32.808*** (6.523)	98.655* (52.508)	200.766** (84.731)	346.260*** (126.837)
ROA	57.222* (29.395)	377.058 (236.611)	69.304 (381.278)	947.472* (570.753)
BM	-259.679 (317.912)	1,518.498 (2,559.007)	-2,816.952 (4,167.509)	5,524.144 (6,238.540)
Leverage	0.007 (0.075)	-0.049 (0.607)	-0.448 (0.960)	-1.184 (1.438)
IO fraction	-59.495* (33.712)	77.916 (271.364)	-760.944* (457.700)	90.213 (685.152)
EINDEX	9.894** (3.859)	57.933* (31.059)	99.572* (52.825)	43.175 (79.077)
Independent director ratio	-1.432 (39.583)	271.865 (318.617)	584.540 (553.293)	687.189 (828.250)
Board size	-0.075 (2.519)	10.849 (20.273)	20.874 (33.496)	104.778** (50.142)
Has female on board	-6.413 (10.409)	21.487 (83.787)	60.479 (140.141)	46.550 (209.784)
Director tenure	1.509** (0.759)	8.470 (6.107)	6.933 (10.005)	-3.723 (14.976)
log(Director ownership)	-7.926** (3.907)	96.762*** (31.450)	-22.474 (52.424)	-98.377 (78.475)
Observations	5,900	5,900	5,593	5,593
R <sup>2</sup>	0.885	0.361	0.761	0.572
Adjusted R <sup>2</sup>	0.852	0.180	0.694	0.451
Residual Std. Error	151.929 (df = 4599)	1,222.938 (df = 4599)	1,933.235 (df = 4356)	2,893.950 (df = 4356)
Firm Year FE	YES	YES	YES	YES

Note:

\*p&lt;0.1; \*\*p&lt;0.05; \*\*\*p&lt;0.01

Table 1.10: Mutual fund opposition in pay proposals and executive compensation

In table 1.10, we present the effect of mutual fund opposition on subsequent CEO compensation. **CEO total compensation** is the CEO's total pay from ExecuComp in year  $t+1$ . **Excess pay (\$ million)** is the part of compensation cannot be justified by firm performance estimated using **Core and Guay [2002]** (in millions). **Predicted pay**, on the contrary, is the part of compensation totally explained by firm performance. See Section 1.5 for details. **avg\_pct\_funds\_against** is the average ratio of **n\_funds\_against** over total number of funds in a given firm year. **log(AT)** is the logarithm of the firm's total assets. **Ret** is the annual return in year  $t$ . **ROA** is the return on asset ratio of the firm. **BM** is the firm's book-to-market ratio. **Leverage** is the firm's market leverage. **IO fraction** is the firm's institutional ownership as a fraction of its market value. **EINDEX** is an anti-takeover measure in **Bebchuk et al. [2008]**. **Board size** is the number of total directors on the board. **Independent director ratio** is the ratio of independent directors over **Board size**. **tenure** is the average years that directors has served on board. **hasfemale** is a dummy variable that equals 1 if there is at least one female serving on board. **directorownership** is the average director holding in the firm. Year and firm fixed effects are also included in each regression. Firm clustered standard errors are reported.

	<i>Dependent variable:</i>			
	CEO total compensation $_{t+1}$	Ln(1 + CEO total compensation) $_{t+1}$	Excess pay $_{t+1}$	Predicted Pay $_{t+1}$
	(1)	(2)	(3)	(4)
avg_pct_funds_against	-896.284** (426.934)	-0.067 (0.048)	-1,643.827*** (487.199)	138.045* (76.981)
log(AT)	1,279.613*** (250.717)	0.237*** (0.028)	-327.639 (291.286)	1,546.781*** (46.026)
Ret	983.958*** (179.615)	0.141*** (0.020)	748.636*** (205.865)	280.220*** (32.528)
ROA	1,667.323** (811.744)	0.293*** (0.091)	1,154.148 (920.820)	527.361*** (145.497)
BM	212.673 (8,768.608)	-3.311*** (0.979)	5,568.544 (9,772.570)	-3,519.277** (1,544.146)
Leverage	-1.220 (2.078)	-0.0001 (0.0002)	0.072 (2.243)	-0.792** (0.354)
IO fraction	-792.297 (928.142)	-0.004 (0.104)	706.098 (1,069.971)	-942.741*** (169.064)
EINDEX	18.455 (106.269)	0.002 (0.012)	71.290 (122.737)	-24.173 (19.393)
Independent director ratio	876.732 (1,089.828)	0.258** (0.122)	519.138 (1,255.982)	369.073* (198.455)
Board size	131.194* (69.328)	0.005 (0.008)	145.927* (80.401)	17.361 (12.704)
Has female on board	-242.936 (286.561)	-0.021 (0.032)	-262.791 (325.893)	-75.864 (51.494)
Director tenure	23.789 (20.889)	0.003 (0.002)	95.571** (43.336)	12.313* (6.847)
log(Director ownership)	46.516 (107.609)	-0.036*** (0.012)	41.847 (128.033)	-16.657 (20.230)
Observations	5,900	5,900	5,026	5,026
R <sup>2</sup>	0.743	0.812	0.528	0.981
Adjusted R <sup>2</sup>	0.670	0.759	0.398	0.976
Residual Std. Error	4,183.354 (df = 4599)	0.467 (df = 4599)	4,454.677 (df = 3941)	703.875 (df = 3941)
Firm Year FE	YES	YES	YES	YES

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Table 1.11: The effect of Say-On-Pay proposals v.s. non-Say-On-Pay pay proposals on compensation. A subsample analysis

This table presents subsample analyses in firm years that had SOP proposals voted and firm years that had non-SOP pay proposals voted. **CEO total compensation** is the CEO's total pay from ExecuComp in year  $t+1$ . **Excess pay (\$ million)** is the part of compensation that cannot be justified by firm performance estimated using **Core and Guay [2002]** (in millions). **Predicted pay**, on the contrary, is the part of compensation totally explained by firm performance. See Section 1.5 for details. **has\_failed\_pay\_prop** is a dummy variable that equals 1 if a firm has a failed pay proposal in year  $t$ . **pct\_funds\_against** is the ratio of **n\_funds\_against** over total number of funds involved in the proposal. **pct\_shares\_against** is the holding-based opposition measure calculated as the total number of shares owned by mutual fund investors voting against management, divided by the number of outstanding shares of the firm. **log(AT)** is the logarithm of the firm's total assets. **Ret** is the annual return in year  $t$ . **ROA** is the return on asset ratio of the firm. **BM** is the firm's book-to-market ratio. **Leverage** is the firm's market leverage. **IO fraction** is the firm's institutional ownership as a fraction of its market value. **EINDEX** is an anti-takeover measure in **Bechtuk et al. [2008]**. **Board size** is the number of total directors on the board. **Independent director ratio** is the ratio of independent directors over **Board size**. **tenure** is the average years that directors has served on board. **hasfemale** is a dummy variable that equals 1 if there is at least one female serving on board. **directownership** is the average director holding in the firm. Year and firm fixed effects are also included in each regression. Firm clustered standard errors are reported.

	Dependent variable:							
	HAD SOP PROPOSALS VOTED				HAD NO SOP PAY PROPOSALS VOTED			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CEO total compensation <sub>(t+1)</sub>	log(1+CEO total compensation <sub>(t+1)</sub> )	Excess pay <sub>(t+1)</sub>	Predicted pay <sub>(t+1)</sub>	CEO total compensation <sub>(t+1)</sub>	log(1+CEO total compensation <sub>(t+1)</sub> )	Excess pay <sub>(t+1)</sub>	Predicted pay <sub>(t+1)</sub>	
has_failed_pay_prop	-566.670 (568.869)	-0.058 (0.061)	-215.130 (667.859)	-131.294 (101.357)	-1,831.423*** (666.243)	-0.136* (0.076)	-2,038.662*** (768.029)	6.025 (112.694)
avg_pct_funds_against	-976.983 (622.937)	-0.057 (0.067)	-1,532.079** (746.175)	134.549 (113.242)	338.819 (611.296)	0.046 (0.069)	-265.867 (692.955)	132.067 (101.678)
log(AT)	825.380** (379.229)	0.106** (0.041)	-791.410* (469.204)	1,237.204*** (71.208)	1,314.088*** (322.272)	0.246*** (0.037)	-185.415 (371.689)	1,513.034*** (54.539)
Ret	709.612*** (239.891)	0.129*** (0.026)	706.409** (282.082)	269.709*** (42.901)	1,084.391*** (228.857)	0.142*** (0.026)	868.912*** (261.068)	258.424*** (38.307)
ROA	438.202 (951.271)	0.073 (0.102)	-247.511 (1,115.845)	501.035*** (169.345)	1,214.952 (1,088.579)	0.337*** (0.124)	741.245 (1,209.520)	676.150*** (177.475)
BM	-1,739.990 (11,644.520)	-2.130* (1.250)	7,869.988 (13,579.270)	-4,715.307** (2,060.841)	-3,582.821 (11,314.860)	-4.385*** (1.284)	1,545.442 (12,691.560)	-3,505.199* (1,862.255)
Leverage	0.336 (2.326)	0.0000 (0.0002)	1.580 (2.540)	-0.460 (0.386)	-1.253 (2.199)	-0.001 (0.0002)	-0.171 (2.367)	-0.736** (0.347)
IO fraction	-491.157 (1,331.132)	-0.082 (0.145)	1,079.279 (1,581.838)	-843.193*** (240.066)	50.206 (1,182.856)	0.115 (0.134)	1,195.721 (1,365.865)	-950.029*** (200.416)
EINDEX	127.125 (159.848)	0.027 (0.017)	216.603 (190.036)	5.542 (28.841)	-85.749 (131.614)	-0.021 (0.015)	-17.247 (151.279)	-15.872 (22.197)
Independent director ratio	964.555 (1,543.078)	0.287* (0.166)	1,118.741 (1,812.287)	124.299 (275.040)	968.651 (1,373.625)	0.233 (0.156)	305.087 (1,395.719)	308.833 (234.143)
Board size	157.135* (84.400)	0.014 (0.009)	155.482 (100.694)	7.536 (15.282)	110.305 (95.634)	-0.001 (0.011)	97.180 (110.113)	19.485 (16.157)
Has female on board	-152.178 (371.108)	0.034 (0.040)	-244.252 (437.466)	37.147 (66.391)	-229.106 (370.748)	-0.043 (0.042)	-184.021 (418.826)	-35.220 (61.455)
Director tenure	8.528 (21.556)	0.001 (0.002)	65.503 (62.122)	35.042*** (9.428)	16.713 (23.824)	0.002 (0.003)	99.617* (57.677)	11.282 (8.463)
log(Director ownership)	-4.968 (140.244)	-0.032** (0.015)	-127.498 (175.149)	47.336* (26.581)	10.227 (142.822)	-0.042** (0.016)	105.800 (168.697)	-39.538 (24.753)
Observations	3,940	3,940	3,321	3,321	3,895	3,895	3,356	3,356
R <sup>2</sup>	0.764	0.862	0.988	0.988	0.773	0.826	0.983	0.983
Adjusted R <sup>2</sup>	0.682	0.814	0.381	0.984	0.668	0.744	0.399	0.976
Residual Std. Error	3,662.189 (df = 2927)	0.303 (df = 2927)	3,959.970 (df = 2479)	600.980 (df = 2479)	4,356.324 (df = 2655)	0.495 (df = 2655)	4,655.856 (df = 2296)	683.162 (df = 2296)
Firm Year Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES

Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Table 1.12: Voting by feet? Mutual fund holding retention after unsatisfactory vote results

In table 1.12, we examine inter-quarter holding dynamics for mutual funds that are affected by unsatisfactory vote results of pay proposals, i.e. mutual funds that vote against management while the proposal still passes. Quarter  $t$  is the quarter when the proposal voting takes place. **Retention** is the average fund holdings in the underlying firm as a percentage relative to the quarter  $t$ , while **Increase**, **Decrease** and **Unchanged** denote average percentage of number of funds that increase, decrease and unchanged their holdings in the underlying firm in that quarter with respect to the prior quarter. In particular, Panel A present results for all observations in the described sample. Panel B focuses on differences between the nature of the proposal voted: Say-on-pay proposals v.s. non-SOP pay proposals. Panel C compares results between active funds and index funds.

**Panel A: All observations**

	<i>Quarter</i>				
	<i>t</i>	<i>t+1</i>	<i>t+2</i>	<i>t+3</i>	<i>t+4</i>
<b>Retention%</b>	100%	67.9%	69.6%	73.7%	73.0%
<b>Increase %</b>		21.5%	34.8%	32.0%	31.7%
<b>Decrease %</b>		53.5%	33.9%	33.0%	27.8%
<b>Unchanged %</b>		25.0%	31.3%	35%	40.5%

**Panel B: SOP v.s. non-SOP pay proposals**

SOP	<i>Quarter</i>				
	<i>t</i>	<i>t+1</i>	<i>t+2</i>	<i>t+3</i>	<i>t+4</i>
<b>Retention%</b>	100%	69.2%	73.3%	80.8%	83.2%
<b>Increase %</b>		24.8%	36.4%	33.5%	36.1%
<b>Decrease %</b>		53.2%	32.9%	34.8%	27.0%
<b>Unchanged %</b>		22.0%	30.7%	31.7%	36.9%

  

non-SOP	<i>Quarter</i>				
	<i>t</i>	<i>t+1</i>	<i>t+2</i>	<i>t+3</i>	<i>t+4</i>
<b>Retention%</b>	100%	66.7%	65.8%	66.5%	62.6%
<b>Increase %</b>		18.1%	33.2%	30.5%	27.3%
<b>Decrease %</b>		53.7%	34.9%	31.1%	28.5%
<b>Unchanged %</b>		28.2%	31.9%	38.4%	44.2%
<i>t-stat(SOP/non-SOP)</i>		2.27	5.07	5.53	7.31

**Panel C: Index v.s. Active funds**

Index funds	<i>Quarter</i>				
	<i>t</i>	<i>t+1</i>	<i>t+2</i>	<i>t+3</i>	<i>t+4</i>
<b>Retention%</b>	100%	75.6%	80.4%	91.2%	93.3%
<b>Increase %</b>		28.2%	40.0%	39.4%	40.4%
<b>Decrease %</b>		46.8%	33.1%	34.0%	27.8%
<b>Unchanged %</b>		25.0%	26.9%	26.6%	31.8%

  

Active funds	<i>Quarter</i>				
	<i>t</i>	<i>t+1</i>	<i>t+2</i>	<i>t+3</i>	<i>t+4</i>
<b>Retention%</b>	100%	59.9 %	58.0%	54.6%	51.5%
<b>Increase %</b>		14.4%	29.2%	24.2%	22.5%
<b>Decrease %</b>		60.5%	34.8%	31.9%	27.7%
<b>Unchanged %</b>		25.1%	36.0%	43.9%	49.8%
<i>t-stat(Index/Active)</i>		13.56	15.14	14.09	15.10

# Chapter 2

## Informed Lenders in the Shorting Market

### 2.1 Introduction

Short selling is considered a key mechanism for the informativeness of asset prices and market efficiency. A large literature shows that short-sellers have superior information about the value of the stock. Their role in information transmission, however, is significantly impeded by various short-sale constraints.<sup>1</sup>

A much less investigated aspect of the shorting market is the information role of lenders. Typically, stock lenders are considered less informed. Their participation in the shorting market is driven by revenue, governance, or tax motives.<sup>2</sup> As such, shifts in the supply of securities for lending are often assumed to be driven by reasons unrelated to the fundamental value of the company. However, given the various institutions that participate in securities lending—

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<sup>1</sup>On the empirical side, papers that document this information transmission include [Geczy et al. \[2002\]](#), [Jones and Lamont \[2002\]](#), [Ofek and Richardson \[2003\]](#), [Asquith et al. \[2005\]](#), [Boehmer et al. \[2008\]](#), and [Engelberg et al. \[2012\]](#). On the theoretical side, [Miller \[1977\]](#), [Diamond and Verrecchia \[1987\]](#), [Duffie et al. \[2002\]](#), and [Hong and Stein \[2003\]](#), among others, analyze the effects of short-sale constraints on security prices.

<sup>2</sup>Deriving income from securities lending on otherwise idle shares is frequently characterized as the main motivation for participation in the market by most institutional lenders (see [D'Avolio \[2002\]](#), for example). [Christoffersen et al. \[2007\]](#), and [Aggarwal et al. \[2015\]](#) investigate the role of equity loans to transfer voting power. [Christoffersen et al. \[2005\]](#) and [Thornock \[2013\]](#) consider the effect of dividend taxation on equity lending markets.

including insurance companies, pension funds, passive index funds, exchange-traded funds (ETFs), and actively managed mutual funds—there is likely substantial heterogeneity in the motives and information sets of these participants.

To understand to what extent information influences lender decisions, we focus on a subset of lenders, actively managed mutual funds, for which we expect information motives to be most salient. We believe these participants are fundamentally different than other institutional lenders for two reasons. First, their asset retention and growth are strongly determined by relatively short-term performance. Second, unlike passive funds or ETFs that are mandated to follow a particular index, active funds are not restricted from selling securities. These active funds will be much more likely to sell stocks that they believe will lose value in the near future rather than hold and lend them. Therefore, actively managed funds will lend stocks only when they feel reasonably informed compared to the broader market. We call this proposed behavior by active funds the “Informed lender hypothesis.”

To test this hypothesis and, more broadly, investigate the role of information in stock loan supply, we focus on a sample of 348 actively managed U.S. domestic equity funds (active funds). These 348 funds participate in stock lending and have their lending activities data available in the Securities and Exchange Commission’s Edgar database for the second half of 2006 and all of 2007. The stock loan data that we painstakingly hand collected not only allows us to observe whether a fund lends, but also which securities it lends at the end of a specific quarter. To the best of our knowledge, we are one of the first to use such detailed data to examine the lending decisions of stock loan suppliers.

We find active mutual funds are important suppliers in the stock loan market. They lend a meaningful fraction of their portfolio, with the average fund in our sample lending about 20% of its stocks. Among funds that report the total dollar amount of stocks on loan, the loan

value accounts for about 14% of a fund's total net assets.<sup>3</sup> Furthermore, using the number of active funds that lend a stock as a proxy for active funds' loan supply at the stock level, we find these funds meaningfully contribute to the total loan supply of a stock. This effect is even while controlling for the overall institutional ownership of a stock. In particular, a one standard deviation increase in the number of lending funds increases the total loan supply of a stock by about 4.6%.

We first analyze these funds' stock lending decisions. Consistent with prior literature that shows both tax and proxy voting concerns can influence an investor's willingness to lend stocks (e.g., [Thornock \[2013\]](#); [Aggarwal et al. \[2015\]](#)), we find that active funds are much less likely to lend stocks that are near a record date for a cash dividend or an annual shareholder meeting. Also, confirming that revenue is a key reason for stock lending, we find that active funds on average are more likely to lend stocks with higher loan fees.

Yet, two new findings also surface in this analysis. First, we find that active funds tend to lend stocks with a more substantial presence in their portfolios. There is a significantly positive relation between a stock's portfolio weight and its likelihood of being on loan. Second, we find that active funds have concave preferences for increasing fees. When loan fees are higher than 4.36% (which corresponds to the 96<sup>th</sup> percentile of the fees' distribution in our sample), active funds become less likely to lend. These results are hard to explain by conventional lending motivations but are consistent with the idea that information is an important factor in determining active funds' stock loan supply. Specifically, considering that an active fund tends to overweight a stock only when it has positive expectations about its future returns, an informed lender will be more likely to pick these stocks to lend. Sim-

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<sup>3</sup>Mutual funds are not required to disclose the dollar amount of each stock lent. So it is impossible to know the exact dollar amount of each stock loan from public data sources. Some funds, however, do report the aggregate value of all stocks on loan, mostly in their semi-annual and annual reports. The SEC's interpretation of the Investment Company Act of 1940 establishes that funds are not allowed to lend more than one-third of their value at any one time. As the mutual funds in our sample are registered under this act, this serves as an upper limit on the total dollar amount of securities lending they can undertake.

ilarly, active funds' reluctance to lend stocks with extremely high stock loan fees is likely a combination of their negative information about these stocks and the signal they ascertain from the high lending fees observed for those stocks.

At the same time, these results are subject to alternative explanations and are not free from endogeneity concerns. For example, the positive relation between portfolio weight and the likelihood of being on loan could also result from a mechanical “inventory effect,” where a fund tends to lend a stock because it holds more shares. More generally, the observed active funds' lending decisions reflect both active funds' lending intentions and the demand levels in the stock loan market. Although we include short interest to control for this demand effect, this approach may not eliminate this confounding effect. This is because short interest itself is the outcome of the market equilibrium. To address this endogeneity concern, we introduce a group of index funds that lend stocks as our control group. Index funds do not rely on firm-specific value information to make investment decisions. As such, their lending behavior is mostly devoid of private information. To the extent that index funds experience similar shorting demand as active funds and their lending mostly mirrors the demand of the shorting market, the difference between active funds and index funds in stock lending activities can be primarily attributed to the information factor.<sup>4</sup>

Specifically, we collect and examine the stock lending activities of 35 index funds as a part of our identification strategy. We find a stock's weight in an index fund does not affect the fund's lending decision. This result suggests the increased likelihood of lending a stock as a function of its portfolio weight is not a mechanical inventory effect for active funds. The index funds also do not exhibit any concavity in terms of the relationship between loan fees

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<sup>4</sup>Kolasinski et al. [2013] provide evidence that because there are multiple intermediaries in the stock loan market, there is some dispersion in lending fees for a given stock across intermediaries. For our demand assumption to hold, this is only problematic if each intermediary systematically only works with active or index funds as the ultimate lenders and consistently receives different demand shocks. As members of a fund family will use the same intermediary and fund families frequently include both active and passive funds, we do not think such systematic stratification of demand is likely.

and lending preferences. Passive funds' responsiveness to fees disappears once we control for market-level demand and supply in the shorting market. This disappearance suggests that even the positive fee relation for index funds could be the result of a passive response to market demand for a stock loan. The sensitivity of active funds' lending decisions to loan fees, as well as its concavity, however, remains unchanged after controlling for these market-level variables.

An overly optimistic lender could act like an informed one and show a strong willingness to lend to short-sellers. To test whether lending funds on average are simply overly optimistic rather than informed, we examine the future returns of those stocks on loan. We find that of all stocks held by active funds, those on loan have higher future returns than those not on loan. In general, the more active funds lending a given stock, the higher its one-month and three-month future returns. We find this evidence while controlling for stock characteristics and short interest in the stock. It strongly supports the informed lender hypothesis. In contrast, we find the opposite result for index funds: future returns are more negative or not different from zero as the number of passive funds lending a stock increases. This result again suggests that passive funds' lending mostly reflects the demand of short-sellers.

Active mutual funds not only make informed lending decisions, but they also make informed recall decisions. We define a stock as recalled by a fund if it is on loan in the previous quarter but not in the current quarter. We find that active funds are quite nimble in their recall and sale decisions. On average, 61.8% of stocks are recalled the quarter following the one in which they are lent. The percentage of stocks recalled increases to 85.7% after two quarters. By the end of four quarters, almost all stocks are recalled. In comparison, index funds' recall activities are much slower and more stable. Such differences suggest that active funds are updating their information more frequently and recalling and potentially selling stocks as appropriate.

Informed lenders will recall stocks when they believe there is a high probability of the price declining. As further evidence supporting the informed lender hypothesis, we find that the recalled stocks underperform the stocks that active funds continue to lend in future quarters. Also, the higher the ratio of funds that recall a stock to those that lend it in a quarter, the lower the future returns over the next one and three months. These findings hold while controlling for short interest and other stock characteristics. In comparison, we find the opposite results for our sample of passive funds. This contrast highlights the heterogeneity of how information affects the loan supply from active and passive mutual funds.

The information that active funds utilize likely comes from two (non-exclusive) sources. First, they presumably have their private valuations that influence their lending decision. The fact that they tend to lend stocks in which they take larger long positions is consistent with this information source. Second, given the option of an active fund to sell any holdings if they receive negative information, they will also monitor and respond to the signals in the shorting market itself. To understand whether active funds update their information in response to signals in the shorting market, we also consider their selling decisions in the regular equity market.

Unsurprisingly, we find that a fund's recall decision is highly predictive of its selling decision. Beyond that, the price signals of the shorting market also affect an active fund's selling decision. In particular, we find that active funds are more likely to sell a stock when the stock's loan fee has increased in that quarter. This result highlights an important information channel between the shorting market and the regular equity market in which informed lenders play a bridging role. Short-sellers can influence the stock's price not only by short selling but also by precipitating sales in the long positions held by informed stock lenders. Again, we find that passive funds are irresponsive to the information of the shorting market.

If active funds are both making informed decisions about which stocks to lend and when

to recall and sell stocks, it should be reflected in their overall performance. As a final test, we examine fund performance as measured by the Fama-French-Carhart four-factor alpha over our sample period. When considering the entire universe of active funds that includes both lending and non-lending funds, consistent with [Evans et al. \[2017\]](#), we do not find that the decision to lend is predictive of higher alpha. This could result from an equilibrium in which funds optimally choose whether to participate in the stock loan market: funds that believe they can lend in an informed manner do so and add value; funds that do not believe they can lend in an informed manner choose not to, and instead add value in other ways. However, when we limit our sample to those funds that lend, we do find some evidence that the more active lenders generate additional alpha. Although we are only considering a relatively short period for this test, it certainly suggests that active funds' performance is not always negatively impacted by their role in equity lending.

This paper contributes to the literature on the efficiency of the shorting market in multiple ways. First, many studies use the presence of institutional investors (such as the breadth of institutional ownership) as a proxy for stock loan supply or a proxy for whether stocks will be short-sale constrained, assuming all institutional investors are alike in making stock loans (see [Chen et al. \[2002\]](#); [Ofek and Richardson \[2003\]](#); [Asquith et al. \[2005\]](#); and [Nagel \[2005\]](#), for example). We show that such an approach ignores the heterogeneity of different institutional investors' stock lending motivations and is over-simplified. A stock with many institutional investors still could face considerable short-sale constraints if these institutional investors are informed and decide not to lend.

Second, our paper highlights a new source of short-sale constraints that arises from the stock lenders' informed lending decisions. We show that active funds are less likely to lend stocks with loan fees at the top end of the spectrum, which are precisely those stocks that are hard to borrow. They are also less likely to lend stocks whose future prices are more likely to

go down in the future. Their reluctance to lend these stocks significantly limits the ability of informed short-sellers to address an asset's overpricing through the shorting market. By highlighting this intrinsic selection mechanism in stock loan supply, this paper significantly expands the literature on the economics of short-sale constraints.<sup>5</sup>

Related, our paper contributes to a literature about the nature of supply and demand in the equity lending market. [Cohen et al. \[2007\]](#) use data on loan fees and quantities from a large institutional investor to isolate shifts in supply and demand for lending. [Kolasinski et al. \[2013\]](#) use an instrumental variables approach to estimate the loan supply schedule and [Blocher et al. \[2013\]](#) use tax consequences related to dividend payments as an exogenous supply shock to equities lending to test implications of their supply and demand model. [Kaplan et al. \[2013\]](#) run a randomized experiment in which a large lender makes certain stocks available to the lending market in order to assess the impact of supply shocks on lending fees and returns. In contrast, we rely on heterogeneity in the type of lenders, namely active and passive mutual funds, as a means to identify determinants of supply. One contribution of our approach is to highlight that the reason for the supply shift in the lending market appears extremely important: supply shifts from active mutual funds with an information component have different determinants and return implications than supply shifts from passive funds.

Finally, our paper suggests an additional connection between the shorting and regular equity markets. While active mutual funds' informed lending supply may impede short selling in some cases, their exit from their underlying long positions (via recall and sale of shares) will likely have a negative impact on the share price. So, although their selection in which stocks to supply to the lending market will increase the likelihood of binding short-sale constraints,

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<sup>5</sup>[Prado et al. \[2016\]](#) also provide supporting evidence on the potential selection problem in stock loan supply. They investigate how institutional ownership structure affects short-sale constraints. Specifically, they find stocks with more concentrated, shorter-term, and less passive ownership exhibit lower lending supply and higher costs of shorting. Our results at the fund-stock level provide more direct and detailed evidence.

they help convey the information of that market into prices. This information channel through these stock lenders is largely absent from the existing literature that discusses the interaction between short-sellers and stock lenders. We believe incorporating this element will significantly improve our understanding of how equity markets correct mispricing.

The rest of the paper proceeds as follows. Section II describes and discusses the sample used in our study. Section III investigates the determinants and returns associated with the lending decisions of funds. Section IV focuses on the recall and selling decision for lent securities. Section V considers the implications of our results on the broader shorting market and the effect of lending on fund performance. Section VI concludes.

## 2.2 Data Collection and Discussion

### 2.2.1 Collecting Active Equity Funds' Stock Lending Data

Mutual funds are the only institutional investors that disclose their stock loan information. In this study, we focus on the U.S. open-end actively managed domestic equity mutual funds (or simply active funds) that lend stocks to test the informed lender hypothesis. We obtain a sample of these funds' detailed stock lending data in the following four steps.

First, we start with all active equity funds from the CRSP survivor-bias free mutual fund dataset for the years of 2006 and 2007. We require that these funds must have at least \$ 10 million in total net assets and be at least two years old.<sup>6</sup> Second, we gather these funds' N-SAR-B filings from the SEC's Edgar database to examine whether they ever lent stocks in the year 2006 or 2007. Required by the Investment Company Act, all mutual funds

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<sup>6</sup>A fund is identified as an active fund if the first three letters of its CRSP objective code are either 'EDC' or 'EDY'. We require a fund to be at least 2 years old since inception to mitigate incubation bias (Evans [2010]).

must disclose in the N-SAR-B form whether they are permitted to lend portfolio securities (Q70N1), and if they are, whether they engage in securities lending during the reporting period (Q70N2). In this step, we identify 621 unique active funds that answer yes to Q70N2 in either 2006 or 2007.<sup>7</sup>

Third, to facilitate the empirical analysis, we require that these identified lending funds must have complete fund characteristics such as returns, expense ratios, and portfolio turnover from the CRSP mutual fund dataset. We also require that they have detailed portfolio holdings from the Thomson Reuters mutual fund holdings dataset. We discard 126 funds in this step because they do not have this information.

Finally, for the remaining 495 lending active funds, we meticulously hand collect their stocks on loan at the end of each quarter from 2006Q3 to 2007Q4. Funds, if lending stocks, report such information in multiple filings. Specifically, they disclose their stocks on loan at the end of first and third fiscal quarters in N-Q forms and at the end of the second and fourth fiscal quarters in N-CSRS and N-CSR forms (the semi-annual shareholder report and the annual shareholder report, respectively).<sup>8</sup> In each filing, stocks on loan are disclosed in the section of “Schedule of Investments.” We lose another 147 funds in this step because we cannot locate any of their filings mentioned above from the EDGAR database. In the end, our sample includes 348 active funds that have detailed stock loan information. Over the six quarters of our sample period, we have 945 observations of lending data at the fund-quarter level.<sup>9</sup>

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<sup>7</sup>The number of active funds that lend identified in this study is very comparable with the number reported in [Evans et al. \[2017\]](#).

<sup>8</sup>More recently, the SEC has changed reporting standards for mutual funds. Forms N-Q and N-SAR have been rescinded and replaced with forms N-PORT and N-CEN, respectively. See <https://www.sec.gov/divisions/investment/guidance/secg-investment-company-reporting-modernization-rules.htm> for additional details.

<sup>9</sup>The actual number of lending-fund-quarter observations is smaller than the theoretical number of 2088 (348\*6 for multiple reasons. The main reason is that most of our sample lending funds do not have outstanding stocks on loan at the end of every quarter over our sample period. Another reason is missing data. For some funds, we cannot always locate their related filings in EDGAR for every quarter over our sample period.

We must stress that the final step of data collection, that is, extracting each lending fund's stock loan information, is extremely laborious.<sup>10</sup> Funds use fine-print footnote symbols to mark their stocks on loan. The symbols used to denote the stocks on loan vary from fund to fund and even from quarter to quarter for the same fund.<sup>11</sup> Although we carefully extract each related filing and hand collect all stocks on loan, the prohibitively high cost of data collection is why this study uses only six quarters of data as the first attempt to understand the role of information in stock loan supply.

### 2.2.2 Characteristics of the Sample of Lending Active Funds

Table 1 reports the summary statistics of various fund characteristics for our sample of lending active funds at the end of 2007. For additional insight, we provide similar information for those funds that are covered by the CRSP fund dataset but not included in the lending group. We refer to this group as the “Non-Lending Active Funds.”<sup>12</sup>

Compared to the group of non-lending active funds, our sample of lending active funds is much larger (in terms of the total net assets), older, and more likely part of a larger fund family (in terms of the total net active equity assets). In part because of their large size, the sample of lending active funds also have lower expense ratios than those funds that are not lending (an average of 1.13% versus 1.29% ). Although active lenders have slightly higher average annual returns during our sample period, their average monthly Fama-French-Carhart four-factor alphas are not different from non-lending funds. Finally, we find that

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<sup>10</sup>The job of collecting the stocks on loan from unformatted data is highly challenging. In addition to the problem mentioned here (identifying the stocks on loan), we also have to overcome the problem that a fund family tends to bundle and file multiple funds' filings in one CIK, making the task of retrieving a specific fund's filing difficult.

<sup>11</sup>Figure IA.1 in the Internet Appendix provides a snapshot of an N-Q form from one of the funds in our data.

<sup>12</sup>Although it is possible that a few of these funds may participate in equity lending but are not captured in our data collection process detailed in Section II.A, the majority of these funds do not.

active lending funds' active shares, as defined by [Cremers and Petajisto \[2009\]](#), are on average lower than those of other non-lending funds (0.75 versus 0.78).<sup>13</sup>

### 2.2.3 Describing Active Funds' Stock Lending Activities

Table 2 provides the first set of results detailing the active funds' stock lending activities. Panel A reports such information at the fund-quarter level. An active fund lends approximately 30 stocks at the end of a sample quarter, accounting for about 20% of the number of all stocks in its portfolio. For the total dollar amount of stock loans, we are able to collect such information for about 52% of our sample. For this subsample, we find the average fund lends about \$ 115.15 million worth of stocks or about 14% of its total net assets. This amount translates to \$ 5.55 million for the average stock on loan. Funds lend out a substantial fraction of those stocks they choose to lend.<sup>14</sup>

Panel B of Table 2 reports the summary statistics of the number of active funds that lend a specific stock in a given quarter. Across all stocks held by the sample of lending funds, a stock is on loan from 1.87 active funds, on average. There is substantial cross-sectional variation, however. Among all stocks held by the sample of lending funds, about 40% of them are never on loan from any active fund. On the other hand, nearly a quarter of stocks have three or more active funds lending them. In the extreme, a stock can be simultaneously on loan from 28 sample funds. If we focus on the subset of stocks that are indeed lent by

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<sup>13</sup>We thank Martijn Cremers for generously providing the active share data. A larger question behind the comparisons in Table 1 is why some active funds lend and others do not. The differences in size and age of funds point to some potential institutional barriers to putting a lending program in place. While an important question, it is beyond the scope of this paper.

<sup>14</sup>A fund is not allowed to lend more than one-third of its value per the SEC's interpretation of the Investment Company Act of 1940 and Section 18(f) in particular. Over time, the SEC's interpretation of this restriction and other regulatory aspects of securities lending has been clarified through a series of no action staff letters. The one-third lending limitation is addressed specifically in the no action letters to Salomon Brothers (publicly available May 4, 1975), SIFE Trust Fund (publicly available February 17, 1982), and Brinson Funds (publicly available November 25, 1997). See <https://www.sec.gov/divisions/investment/securities-lending-open-closed-end-investment-companies.htm> for more information.

active funds, lending activities at the stock level become even more pronounced. On average, stocks in this subset have three funds lending it to the shorting market.

### 2.2.4 Do Active Mutual Funds Meaningfully Supply the Shorting Market?

One concern with our data is that because we cannot observe the exact dollar amount of each stock lent by active mutual funds in our sample, the economic significance of these funds' participation in the lending market remains unclear.<sup>15</sup> In Table 3, we address this concern by gauging whether active funds contribute to the stock loan supply in an economically meaningful way.

For this analysis, we measure a stock's total loan supply in a given quarter as the average ratio of the daily lendable shares to the daily outstanding shares within this quarter. We obtain the information of lendable shares from the Markit dataset. We use the number of lending active funds at the stock level as a proxy for equity loan supply from active funds. If active mutual funds as a group are important participants in the stock loan market, we would expect to find a positive relationship between this variable and the total loan supply.

Table 3 reports the results from the regression of the quarterly loan supply for each stock on the number of funds lending the stock. In Column 1, without any controls, each additional actively managed mutual fund that lends a stock is associated with a 1.79% higher aggregate loan supply, on average. Given that the average loan supply in our sample is about 22% , this result suggests that active mutual funds are an economically meaningful contributor to a stock's loan supply.

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<sup>15</sup>As discussed in Section II.C, we only have data on the amount lent for a subset of our sample. Our amount information is aggregated across all stocks for the fund, and not on a stock-by-stock basis.

It is possible, however, that these mutual funds do not lend a large amount of stock but just happen to lend those stocks that are more likely to be on loan in general. To understand if this reason can explain our estimate, in Column 2 of Table 3, we include a host of stock-level control variables that may relate to the supply or demand for stock loans. In particular, we use the stock's market capitalization, market-to-book (MB) ratio, past returns, return volatility, sales growth, return on assets (ROA), stock turnover ratio, and Amihud illiquidity measure. These variables come from the CRSP and Compustat datasets. We also include financial analyst coverage information for each stock, such as the number of financial analysts following each stock and the analyst forecast dispersion from the I/B/E/S dataset. The definitions for these variables can be found in Appendix A. When including these additional control variables, the coefficient for the number of lending active funds remains highly significant and positive. So although these variables help explain more of the stock-level variation in loan supply, the more active funds that lend a stock, the higher its loan supply.

A broad literature has argued institutional ownership is a good proxy for loan supply, in part because of the difficulty of observing which institutions choose to lend a stock (e.g., [Chen et al. \[2002\]](#); [Nagel \[2005\]](#)). It is possible, therefore, that these mutual funds do not lend a large amount of stock but are just more likely to lend stocks with a higher loan supply from other institutional investors. In Column 3, we include institutional ownership as an additional control variable. This variable is extracted from the Thomson Reuters 13f dataset. Results show that a one standard deviation increase in a stock's institutional ownership is associated with an 8.6% increase in loan supply.<sup>16</sup> Interestingly, even after controlling for institutional ownership, an additional active fund that lends is still associated with a 0.24% increase in aggregate loan supply. As these funds' holdings are included in the institutional ownership variable, this estimate no longer conveys the full impact of

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<sup>16</sup>The exact calculation is  $0.3171 * 0.27 = 0.0856$ .

an active fund on loan supply. Instead, it has the following interpretation: holding the amount held by all institutions fixed, the decision of an active fund to lend is associated with higher aggregate loan supply. This finding also suggests that our lending variable contains additional information about the lending market beyond the institutional ownership measure.

### 2.2.5 A Selected Sample of Equity Index Funds that Lend

For much of our analysis, we also include a selection of equity index mutual funds. To the extent that index funds do not use firm-specific valuation information, these funds' lending activities offer an excellent opportunity to understand the counterfactual of what drives stock lending decisions in the absence of private information. As such, even though they are not the focus of this study, index funds serve a crucial function in our identification strategy for the empirical analysis.

Of all equity index funds covered by the CRSP mutual fund dataset in 2006 or 2007, there are about 72 that lend stocks in either year based on their N-SAR forms.<sup>17</sup> To make the data collection more cost-effective, we select about half of them (35) for our analysis.<sup>18</sup> Of the funds selected, 18 are drawn from large fund companies (Vanguard, Fidelity, DFA, T. Rowe Price) because of their dominant roles in index investments. The other 17 are randomly drawn from the remaining pool. This procedure ensures that our selected sample of index funds covers the major equity index funds but also represents other smaller ones.<sup>19</sup> We follow

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<sup>17</sup>We choose conventional open-end equity index funds, instead of exchange-traded funds (ETFs) as our control group because we do not want to confound our identification strategy by introducing other institutional differences between the conventional open-end funds and the ETFs. We recognize that how ETFs lend stocks is an important question in itself. Yet, it is not the focus of this study.

<sup>18</sup>Equity index funds tend to hold large numbers of stocks. For example, for an index fund tracking the Russell 3000 Index or the overall equity market, the number of stocks it holds can be 3000 or even more. This makes the cost of collecting all index funds' stock lending data even more prohibitive.

<sup>19</sup>Please refer to the Internet Appendix (Table IA.2) for the complete list of these selected index funds.

the same data collection process as for the active funds to obtain the stocks on loan from these selected index funds. Over the sample period of 2006Q3 to 2007Q4, we obtain stock lending data for 106 fund-quarters.

Table 4 summarizes these selected index funds' stock lending activities. Panel A reports the average number of stocks on loan from each fund in a given quarter during our sample period. An average index fund lends about 196 stocks per quarter, with the median being 87. Reflecting its more diversified portfolio structure, although an average index fund lends many more stocks than an active fund, as a fraction of their portfolio, it lends much less. In particular, the stocks on loan from a typical index fund account for about 13% of its overall portfolio. For the 18% of fund-quarter observations in which we observe the dollar amount lent, we find that the average index fund lends about \$ 73.63 million, accounting for 10% of its total net assets. This percentage suggests that index funds lend a large portion of their position, conditional on lending a given stock. Yet, the value of a specific stock on loan by an index fund is about \$ 0.5 million, showing that although index funds lend a lot of stocks, the amount of each stock loan is modest.

Panel B of Table 4 reports how many selected index funds are lending a specific stock. When considering the entire universe of stocks held by these index funds during our sample period, the average stock is on loan from 0.37 funds. If one focuses on the stocks lent by index funds in a given quarter, about 1.39 funds are currently lending a stock.

## 2.2.6 Stock Characteristics

Before we formally test the informed lender hypothesis, we provide summary statistics for the stocks held by active or passive mutual funds in Table 5.<sup>20</sup> In addition to the stock

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<sup>20</sup>The exact definitions of these variables are in Appendix A.

characteristics mentioned in Section II.D, we include three new variables that are related to the shorting market: *Short Interest*, *Stock Loan Supply*, and *Stock Loan Fee*. For those stocks held by lending active funds, their average short interest is about 6% of outstanding shares. Their average stock loan supply is about 22% of total outstanding shares. The average stock loan fee is 79 basis points, with a median fee of 43 basis points. These statistics show that although we are considering the subset of U.S. equities which are held by these funds, their lending characteristics are in line with the broader market (see, for example, [Engelberg et al. \[2012\]](#)).

Table 5 also includes four variables that are defined at the fund-stock level: *Near Div. Record*, *Near Vote Record*, *Portfolio Weight*, and *Ownership in Firm*. *Near Div. Record* indicates whether, at a specific quarter-end, there is a cash dividend record date forthcoming within 15 days for the stock. *Near Vote Record* similarly marks if there is a proxy voting record date within 15 days following the quarter-end for the stock.<sup>21</sup> Among stocks held by the lending active funds, 6% have a dividend record date within 15 days, and about 1% have an annual proxy vote record date within 15 days.<sup>22</sup> Table 5 also shows that a sample stock's weight in an average active fund is about 0.82%. At the same time, an average active fund holds about 0.36% of all outstanding shares of a sample stock.

Table 5 also reports the same set of variables for the stocks held by the selected index funds. An important finding is that stocks held by active funds are significantly different from those held by passive funds in many dimensions. On average, stocks held by active funds are much larger, have lower MB ratios, and higher returns. They are also more liquid, relatively less volatile, and receive more analyst coverage than stocks held by index funds. All these results

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<sup>21</sup>These two variables are fund-stock level because although the majority of sample funds use the calendar quarter-end as their fiscal quarter-end, some use other months as their fiscal quarter-end.

<sup>22</sup>The value of *Near Div. Record* is much higher because even though many firms do not pay dividends, those that pay tend to do so every quarter, or even more frequently. On the other hand, regular proxy voting is always once a year.

suggest that index funds include many illiquid small-cap growth stocks that active funds do not hold. In the following empirical analysis, we explicitly address the issue of different stock holdings between these two groups of funds.

## 2.3 Evidence on Informed Lenders

In this section, we empirically test whether active mutual funds as a group are informed lenders in the stock loan market. We first examine how these funds select stocks to lend. Next, we examine the future performance of the stocks that are lent by these funds. The idea here is intuitive: informed lenders will not lend a stock if they expect its future price to decline significantly. To address the concern that our results might be confounded by demand factors in the stock loan market, we repeat the analysis for a group of selected index funds, which serves as our counterfactual of lending without private information.

### 2.3.1 Mutual Funds' Stock Lending Decision

Our detailed stock lending data allows us to directly observe which stocks are lent by active mutual funds, and which are not. In this subsection, we use this rich data to characterize active mutual funds' stock lending decisions. The data also allows us to account for several existing theories on the determinants of stock loan supply.

Specifically, we run the following OLS regression at the fund-stock-quarter level:

$$\text{On Loan Dummy}_{f,i,t} = \beta_1 \text{Stock Variables}_{i,t-1} + \beta_2 \text{Fund\_Stock Variables}_{f,i,t-1} + \gamma_t + \varepsilon_{f,i,t} \quad (2.1)$$

Here the dependent variable *On Loan Dummy* is an indicator that fund  $f$  is currently lending stock  $i$  at the end of quarter  $t$ . *Stock Variables* include characteristics such as *Log Size*, *MB Ratio*, past returns (*3-Month Past Return*, *12-Month Past Return*), recent accounting performance (*Sales Growth*, *ROA*), liquidity (*Stock Turnover*, *Amihud Ratio*), volatility (*Return Volatility*), and analyst-related variables (*No. of Analysts*, *Analyst Dispersion*). To verify whether dividend taxes (e.g., Christoffersen et al. [2005]; Thornock [2013]) and proxy voting (e.g., Christoffersen et al. [2007]; Aggarwal et al. [2015]) affect mutual funds' stock lending, we also include indicators if there is a dividend record date or proxy voting record date forthcoming in the fifteen days following the end of the quarter (*Near Div. Record*, *Near Vote Record*). These variables form our baseline determinants of a fund's stock lending decision. All the variables are measured at a lag, except for *Near Div. Record* and *Near Vote Record*.<sup>23</sup> The specification includes quarter fixed effects to account for macroeconomic trends in lending decisions. All variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles to mitigate the impact of outliers in our analysis.

The results are presented in Table 6.<sup>24</sup> To identify the unique lending behavior of active funds, we explicitly contrast the coefficients for active funds (Columns 1-5) against a select group of index funds (Columns 6-10). The reason is as follows: without an instrumental variable or another identification shock, the estimated coefficients from equation (1) are a result of intersecting supply and demand forces. As we are interested in what decisions active funds make, we want to focus on the determinants of supply, controlling for demand. Under the assumption that for a given stock in a given quarter, all lenders are exposed to the

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<sup>23</sup>The exact lag of each variable depends on its reporting frequency. For example, stock financial characteristics such as MB ratio, ROA, and sales growth are reported every year. As such, their lagged values are as of the last fiscal year end. Fund-holding related variables are updated quarterly. Therefore, their lagged values are as of the last quarter. The remaining variables in this analysis are constructed at a monthly frequency, such as size, past returns, loan fees, and so on. For these monthly reported variables, their lagged values refer to the month prior to the lending disclosure date.

<sup>24</sup>We provide a version of Table 6 using a Logistic regression as Table IA.3 in the Internet Appendix. The results are economically and statistically similar.

same demand forces, any differences in coefficients between active and index funds must be driven by lender supply differences. Further, index funds do not have the same motivation to utilize stock-specific information to change positions in a stock. Therefore, to the extent that information specific to the stock factors into the lending decision, this will be concentrated in the response of active funds.

Columns 1 and 6 of Table 6 present the estimates for active funds and selected index funds, respectively. We find that both types of funds are more likely to lend higher market-to-book stocks, as well as stocks with higher turnover, higher liquidity (lower *Amihud Ratio*), and more disagreement among analysts (higher *Analyst Dispersion*). Given the similar estimates for both types of funds, we take these coefficients to be mainly driven by demand or, alternatively, from common supply-side motivations. Consistent with prior literature, we find both types of funds are less likely to lend stocks with an upcoming dividend or voting event, although these effects are more significant for active mutual funds. Where active funds and index funds deviate in lending decisions are in the size and performance characteristics of the firm. We find that active funds are more likely to lend smaller stocks and those with higher sales growth. Index funds are more likely to lend stocks with lower past twelve-month returns, compared to active funds. This result offers the first evidence that active funds may be more selective in what stocks they agree to lend, compared to index funds.

In Columns 2 and 7, we include the stock's lagged weight in the fund's portfolio (*Portfolio Weight*), and the fund's lagged ownership stake in the firm (*Ownership in Firm*). We find that the larger the active fund's weight in a given stock, the more likely they are to lend it to the shorting market. In particular, the average marginal effect for a one standard deviation increase in a stock's portfolio weight on the propensity to lend is 6.83%. In contrast, this variable is insignificant in explaining the selected index funds' decision to lend. The latter result suggests that an inventory effect cannot fully explain this finding. If funds are more

likely to lend a stock just because they have more of it, we would expect a similar result for the index funds. On the other hand, this portfolio weight effect does not contradict the informed lender explanation. To the extent that active funds choose to take larger weights in stocks with positive prospects, these funds may also be more likely to lend them, earning lending interest with minimal concern that these stocks' prices will go down significantly in the near future. We examine the future returns of these stocks in the next section.

Unlike portfolio weights, the ownership fraction does not directly address the informed lending hypothesis. We include it in our analysis to gain further insight into the relationship between institutional ownership and stock loan supply documented by [Prado et al. \[2016\]](#). Specifically, they find that institutional ownership concentration is negatively related to stock loan supply. They suggest this is because active investors with significant ownership stakes are more likely to withhold stock from the equity lending market because of concerns that short selling may lead to a decline in price. In Column 2, we find that an active fund's ownership fraction in a firm is negatively related to its likelihood to lend, but is not statistically significant. In contrast, for selected index funds (Column 7), we find a strong and negative relationship between a fund's ownership fraction and its tendency to lend a stock. Our results at the investor-stock level offer a more complicated picture of the relationship between ownership and the willingness to lend stocks.

In Columns 3 and 8 of Table 6, we add the lagged stock loan fee to examine mutual funds' revenue motivation for lending stocks. The lagged stock loan fee, from the Markit database, is the most recent monthly fee charged in the stock loan market. Although the stock loan fee is typically paid to the intermediary agent instead of the ultimate lenders, it has a high correlation with the actual fee received by the lending funds ([D'Avolio \[2002\]](#)).<sup>25</sup> Therefore, we use the stock loan fee as a proxy for the revenue funds receive from stock loans. We

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<sup>25</sup>Typically, the ultimate lender receives between 70% and 80% of the stock loan fee, sometimes more.

find both active funds and index funds are more willing to lend stocks with higher loan fees, suggesting revenue is a common motivation for stock lending.

Although these are lagged fees, there is still a concern that the fees are indicative of a demand effect. In particular, stocks in high demand for shorting will command higher fees. If funds passively agree to lend whatever they hold and a stock's loan supply is low, this combination can generate a positive correlation between loan fees and lending. To address this concern and understand the role of shorting demand on a fund's propensity to lend a specific stock, in Columns 4 and 9, we introduce the stock's contemporaneous short interest as a proxy for the demand for loans. We also include a measure of the aggregate loan supply. To the extent that short interest and loan supply represent current loan market conditions, one can interpret the individual fund's decision to lend as holding fixed the aggregate level of supply and demand. Even if demand does not fully drive the fee effect, it is not clear whether mutual funds intentionally provide more loans when the loan fee is exceptionally high. Therefore, we add a quadratic term for the loan fee, to explore whether active funds continue to seek lending revenue even for extreme loan fees.

Indeed, we find that for both types of funds, the likelihood of lending increases with short interest and decreases with aggregate stock loan supply.<sup>26</sup> After controlling for the stock-level aggregate short demand and loan supply, we find that active funds' propensity to lend exhibits a concave pattern with respect to fees. Given the coefficients for active funds in Column 4, the propensity to lend is increasing until a fee of 4.36% (which is about the 96<sup>th</sup> percentile in our observed distribution of fees), beyond which point active funds become less likely to lend.<sup>27</sup> The concave relationship between fees and the propensity to lend for active funds suggests that despite increased revenue, these funds are less incentivized to lend as fees

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<sup>26</sup>In this specification, the aggregate loan supply captures the likelihood that a specific fund's shares are borrowed, since we are controlling for short interest separately.

<sup>27</sup>Given the linear and quadratic term, the inflection point is.

go higher. This result is consistent with the idea that active funds are informed lenders. We suspect they take this shorting pressure as an informative signal for the stock. An extremely high fee makes them more likely to recall the stock (if already on loan) and ultimately sell their position in the stock. We investigate this channel directly in Section IV.

For index funds, once we control for the aggregate supply and demand of stock loans, neither the coefficient of the lagged stock loan fee nor its quadratic term is significant. These results suggest that unlike active funds, index funds are mainly serving as a conduit for shorting demand rather than deciding which stocks to lend based on their information. In addition, once we include the market demand and supply variables, many of the other explanatory variables, such as *MB Ratio*, *Stock Turnover*, and *Analyst Dispersion*, lose significance for the index funds (Column 9). These variables likely reflect the short demand and are therefore subsumed by short interest.

Finally, a key assumption in our identification strategy is that index funds hold similar stocks as active funds. Yet Table 5 shows there are significant differences in the average characteristics of stocks held by these two groups of funds. To address this concern, we identify a group of stocks that are held by both the active mutual funds and the selected index funds. In Columns 5 and 10 of Table 6, we repeat our analysis on this common set of stocks. They are almost identical to those reported in Columns 4 and 9, strongly suggesting the observed differences between active and index funds are not driven by the differences in stocks they hold.

### **2.3.2 Future Returns of Stocks Lent by Active Mutual Funds**

The fact that active mutual funds are more likely to lend stocks with a greater presence in their portfolios is consistent with, but not exclusive to, an informed stock loan supply. Even

if funds believe they have superior information about a stock's future returns, it could be a function of optimism. To determine whether, on average, this lending appears informed, we turn to future returns. In Panel A of Table 7, we present a simple univariate result. At the end of each quarter, we separate the stocks into two groups. The first group are those stocks on loan from at least one active fund. The second group are those stocks that are held but not on loan from any of the active mutual funds. We repeat this sort each quarter and compare the average future returns of these two groups over various time horizons ranging from one month to twelve months. We find over one, three, six, and twelve-month horizons, the stocks on loan significantly outperform the stocks not on loan. For example, the average future three-month return of stocks on loan from active funds is about -1.79% , yet that of stocks not on loan is -3.61%. On a first pass, it does not appear that active mutual funds are choosing to lend their worst holdings.

Given that these return patterns can be driven by heterogeneity in stock characteristics or demand in the shorting market, in Panel B of Table 7, we run a multivariate regression. As our analysis is at the stock level, we use two variables to measure the lending activity by active funds. The first, *Stock On Loan Dummy*, is an indicator that at least one active mutual fund is lending that stock in that quarter. The second, *No. of Funds Lending*, is the number of active funds lending the stock in that quarter. We control for stock characteristics such as size (*Log Size*), book-to-market ratio (*BM*), the past year's return, and current short interest in the stock. We also include quarter fixed effects to control for overall market conditions.

Columns 1-4 consider different future return horizons for our *Stock On Loan Dummy* variable. We find that for the next month's return, at least one mutual fund lending the stock is associated with a 64 basis point higher return (Column 1, or 7.96% as an annualized return). While *Stock On Loan Dummy* does not predict significantly positive returns at longer

horizons, it does not predict negative returns either. And as funds can recall and sell stocks at any point, they may have exited lending positions if their opinion of the stock's prospects has changed. We test for this possibility in Section IV.

The remaining columns (Columns 5-8) of Panel B in Table 7 consider whether there is incremental information from how many funds choose to lend a given stock. Indeed, we find that each additional active fund that decides to lend a stock is associated with a 19 basis point higher return for both the one-month and three-month return horizons (Columns 5 and 6). A similar positive coefficient also holds for the six-month horizon, although only statistically significant at the 10% level. The more active mutual funds that are willing to lend a specific stock, the more likely it is to perform better in the future. Overall, we do not find any evidence that stocks lent by active funds perform any worse than other stocks they hold.

As increased short demand is associated with lower future returns ([Jones and Lamont \[2002\]](#)), we do not think short demand drives the above results. Indeed, throughout Panel B of Table 7, we include short interest and find that it predicts lower future returns. Nevertheless, as a point of comparison, in Panel C of Table 7, we repeat the analysis for our sample of index funds. Here we find the opposite effect: lending by index funds predicts lower future returns, especially at the one-month horizon. The fact that stocks that are lent by active funds tend to perform better, whereas stocks lent by index funds tend to perform worse, highlights the heterogeneity of the stock loan suppliers. We believe that informed lending on the part of active funds is a principal driver of this heterogeneity.

## 2.4 Loan Recalls, Stock Sales, and Associated Returns

In Section III, we show that the lending behavior of active mutual funds is consistent with the informed lender hypothesis. If lenders are informed, they will not only avoid lending stocks whose price will go down but also recall any loaned stocks before they lose value. They will recall the loans so they can sell their long positions in the regular equity market. We also expect informed lenders to respond to changes in lending market conditions when making their recall and selling decisions as short-sellers are often informed. In this section, we examine these implications.

### 2.4.1 The Recall Decision of Lending Funds

Most securities loans are structured so that lenders can recall them at any time. Thus, an equally important component of the stock lending decision is when to recall a loan and potentially sell a stock. We use the disclosed on loan status to infer the recall activities. In particular, we assume stock  $i$  is recalled by fund  $f$  at the end of quarter  $t$  if it is on loan at the end of quarter  $t-1$  but not so at the end of quarter  $t$ . We recognize that this approach has some noise as it implicitly assumes that all recalls occur at the end of the quarter, which is not the case. Nevertheless, it is the best method given the publicly available data to capture the recall activities at the investor-stock level.

First, in Table 8, we present a transition matrix for lending activity. If a stock is on loan at the end of quarter  $t$  from an active fund (Panel A), we calculate the likelihood that a stock continues to be on loan, is recalled (but not totally liquidated), or is entirely liquidated from the fund's portfolio over the next four quarters.<sup>28</sup> Active funds appear to recall and

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<sup>28</sup>In this framework, the sum of recalled and liquidated stocks can be thought of as the total percent recalled, since recalling a security is a necessary precondition for liquidation.

sell stocks on loan quickly. About 62% of stocks are no longer on loan in the next quarter. Furthermore, conditional on a stock being on loan this quarter, only 0.12% of stocks remain on loan after four quarters. About 95% of stocks initially lent by active funds are completely sold after one year.

Short-sellers can also return shares and thus terminate the stock loan. To examine whether the above results just reflect a demand-motivated effect, Panel B of Table 8 reports the similar transition matrix for the stocks lent by the group of selected index funds. Although the recall rate of index funds in the next quarter is comparable with that of active funds (62.22% compared to 61.81%), the difference between these two groups appears rather stark at longer horizons. For example, after two quarters, index funds are still lending about 36% of their stocks, significantly higher than the 14% of stocks still on loan from active funds. While active funds recall almost all of their stocks that are lent one year ago, index funds still have 33% of such stocks on loan.<sup>29</sup> Results in Table 8 suggest that active funds appear to respond aggressively to changing conditions for the stocks they initially lend, especially compared to index funds.

Next, we consider the future returns of the recalled stocks. Informed lenders should recall and sell stocks on loan if their prospects deteriorate. Panel A of Table 9 presents a univariate analysis of the future returns of stocks that have been recalled or are on loan. The results are consistent with what informed lending predicts. In particular, we use two rubrics to sort stocks. In the first rubric, we divide the universe of stocks that have been on loan from active mutual funds into two types: (i) stocks that have been recalled by any fund at the end of the quarter, and (ii) stocks that are only on loan and have not been recalled by any

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<sup>29</sup>We find that the percentage of stocks that continue to be on loan from index funds is not monotonic over the time horizon. Specifically, about 18% of stocks continue to be on loan at the end of three quarters, but the number increases to 33.01% at the end of four quarters. This reversal implies that index funds might recall certain stocks temporarily and re-lend them afterward, an occurrence not observed among active funds. Finally, as index funds are restricted in what stocks can be sold from their portfolios, their low liquidation rate in Panel B of Table 8 is not surprising.

fund that quarter. In the second rubric, we classify a stock as recalled if more funds have recalled the stock that quarter than placed it on loan. Similarly, a stock is classified as on loan if more funds are lending it than have recalled it that quarter.

In both classifications, we find the same result: the recalled stocks perform significantly worse over the one-month and three-month horizons than those stocks which are on loan. Comparing the two classification schemes, sorting based on the relative number of stock recalls and stock loans (rubric # 2) appears more informative. For example, the recalled stocks perform over 3% worse than the stocks on loan over the next month. They continue to underperform over the next year. These results complement the similar univariate analysis in Table 7: the future returns of stocks on loan are not significantly negative but recalled stocks are strongly negative at short horizons.

Overall, it appears that when funds lend stocks, they actively monitor and recall stocks before the most negative returns are realized. To make sure this result is not driven by compositional or demand differences, in Panel B of Table 9, we turn to multivariate analysis. Motivated by our findings in Panel A, we introduce a new variable, *Recall/On Loan Ratio*. It is defined as the number of funds that have recalled a given stock divided by the number of funds that lend that stock in a quarter. The larger the ratio, the more active funds that are recalling the stock. In this regression, we control for the same stock characteristics and short interest as in Panel B of Table 7. The sample includes all stocks that were on loan by any active funds in the previous quarter.

In Panel B of Table 9, we find that a higher ratio of recalls is very predictive of negative future returns at short horizons, specifically for one and three months. For example, if the *Recall/On Loan Ratio* increases from 1 to 2 (so twice as many funds recall as lend), we estimate the next month's return to decrease by 81 basis points (or 10.16% as an annualized return). The *Recall/On Loan Ratio* is similarly predictive at the three-month horizon, although only

statistically significant at the 10% level. Since this finding is while controlling for short interest and other stock variables, the recall and lending activity of active mutual funds conveys meaningful information about future returns.

As before, the concern remains that the *Recall/On Loan Ratio* might capture some demand forces. However, this would suggest that the short-sellers exit too early; if increased recalls or decreased loans are driven by short-sellers closing positions, the strongly negative future returns appear to be a missed opportunity. To serve as a comparison group, in Panel C of Table 9, we repeat the analysis of Panel B but for the sample of stocks lent by the selected index funds. Here we find the predictive power of the *Recall/On Loan Ratio* for future returns goes in the opposite direction. This result is consistent with passive recall behavior and is likely coming from the demand side. Short-sellers buy back the shares and return them to the lenders after stock prices have incorporated the negative news.

### 2.4.2 The Stock Selling Decision of Lending Funds

A large number of papers show that the shorting market contains valuable information about the future price movements of stocks. Yet so far, no paper has examined whether active mutual funds pay attention to the changing conditions in this market when making their stock selling decisions. In this section, we consider what drives the selling decision of mutual funds. Given the dynamic nature of loans and recalls by active funds, we want to confirm whether funds sell their positions when conditions in the equity loan market suggest doing so. This analysis serves as a further test of the informed lender hypothesis and helps establish an often omitted connection between the equity shorting market and the regular equity market. We argue that active funds are a key link that allows the short-sellers' information to propagate from the shorting market to the regular equity market.

Specifically, we run a fund-stock-quarter level OLS regression for whether a fund chooses to sell one of its held stocks. The dependent variable *Sell Dummy* equals one if a fund either reduces its position in a stock or liquidates it at a specific quarter-end. Table 10 reports the results.<sup>30</sup> Columns 1-3 consider the stock selling decision for the active funds. As a comparison, Columns 4-6 consider the stock selling decision for the selected index funds. For both types of funds, we find a loan recall is highly predictive of a sale of a position. It is reassuring that funds typically sell positions in stocks that they recall.

In Column 2, we find that the active fund's selling decision is also positively affected by the lagged short interest: the higher the short interest, the more likely the fund is to reduce a stock's position. In comparison, we find no such effect for the sale decision of index funds (Column 5). The stock loan fee, and in particular its change, perhaps serves as the best and most direct indicator of the changing demand and supply of a stock in the shorting market. In Column 3, we include both the lagged stock loan fee and the change in the loan. Although the active funds' selling decision is not responsive to the lagged stock loan fee, we find a strong and positive relationship between the change in fee and the selling decision. An increase in the loan fee from the prior month to the end of this month predicts that an active fund will sell the stock. For index funds, however, their selling decisions are unaffected by the stock loan fee, either in levels or in changes (Column 6). We take the active funds' response to short interest and increased fees as incorporating information about the stock from the lending market.

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<sup>30</sup>Please refer to Table IA.4 in the Internet Appendix for the results using a Logistic regression. The results are very comparable in terms of economic and statistical magnitude.

## 2.5 Additional Implications of Informed Lending

### 2.5.1 Loan Supply Effects

Beyond fund-level stock lending and recall decisions, we believe our results carry implications for the equity lending market more broadly. First, active mutual funds frequently enter and exit the lending market for specific stocks and have a meaningful impact on the aggregate lending supply. About three active funds lend the average stock on loan and contribute 5.4% to the stock loan supply.<sup>31</sup> This percentage change is almost half of the sample standard deviation for loan supply (12% ) and suggests that they may often be the marginal lender in a stock. In general, the stock loan supply curve has been found to be highly non-linear, with the curve being steepest for those stocks most in short demand (Kolasinski, Reed, and Ringgenberg 2013). As active funds are more hesitant to lend these highest-fee stocks, their absence likely contributes to any constraints on borrowing these stocks.

Second, if active funds currently lend a stock but observe adverse changes in the lending market (such as increasing loan fees), they are more likely to recall the loan. The exit of these funds from lending a given stock will likely exacerbate short-sale constraints. However, it does not prevent this negative information from being reflected in stock prices. These funds are likely to sell the stock upon recall, which puts downward pressure on prices to the extent that other participants view these trades as informed. Indeed, if the funds are incorporating information they observe from the quantity and price conditions in the shorting market, they are transmitting this information rather than the short-sellers themselves. This argument implies that the source of constraints in the shorting market is important. Whether price efficiency and other benefits of short sales are impeded depends on whether constraints

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<sup>31</sup>As a back of the envelope calculation using the mean number of lenders and the coefficient from Column 1 of Table 3, the estimated change in loan supply is  $3.02 * 0.0179 = 0.0541$ .

arise endogenously (e.g., from a contraction in informed lending supply) or are exogenously imposed (e.g., from a short-sale ban or other regulatory action).

### 2.5.2 Stock Lending and Fund Performance

In general, we find that active mutual funds' participation in the equity lending market appears informed. They choose to lend stocks that are larger fractions of their portfolio, and these stocks do not underperform over a one-month to twelve-month horizon. Further, they recall and sell stocks before substantial underperformance is realized and appear to incorporate some information from changes in fees in the lending market. If these funds are engaging in informed lending, one implication is this should have a positive effect on their performance.

Specifically, we examine the empirical relation between a fund's lending activity and its Fama-French-Carhart four-factor alpha. The alpha is estimated as the difference between a fund's monthly return and its four-factor expected monthly return, averaged over twelve months in 2007. We use 36 months of past returns data to estimate a fund's factor loadings. Table 11 reports the OLS regression results. In this table, we include two specifications: one that uses an indicator for whether a given fund lends (*Lending Dummy*), and a second that uses a measure of lending intensity,  $\text{Log}(\text{No. of Stocks Lent})$ . The first specification uses the entire universe of active funds, and the second specification focuses on the subsample of active funds that lend stocks in 2007. We also control for a set of fund variables that influence returns and fund alpha, such as fund size, portfolio turnover, expense ratio, age, flows, past alpha, and active share.

In the first specification of Table 11, the lending dummy does not have a significant effect on the four-factor alpha. On average, funds that lend and those that do not lend have very

similar performance. This could be due to a power issue related to our limited data or result from an equilibrium in which funds optimally choose whether to participate in the stock loan market. Those funds which can lend in an informed manner do so and add value; funds which cannot lend in an informed manner choose not to, and instead add value in other ways. This result is in contrast to [Evans et al. \[2017\]](#), who document a negative relation between funds' decision to lend and alpha. We note that our sample only overlaps with the final year of their sample.

Turning to the subsample of funds which lend, however, we find some evidence showing that the funds with more lending activity have higher four-factor alphas. In particular, the result in Column 2 shows that a fund with 10% more securities lent has an estimated alpha that is 27 basis points higher (or 3.29% as an annualized alpha).<sup>32</sup> This coefficient is significant at the 10% level.<sup>33</sup> In short, among those funds that lend stocks, funds that lend more aggressively seem to add value for their shareholders.

## 2.6 Conclusion

Based on detailed lending data, we argue that actively managed mutual funds play a unique and important role in the equity loan market. In comparison to passively managed index funds, their choice to lend particular stocks appears informed. They tend to lend stocks in which they hold larger portfolio positions, and these stocks do not underperform in the subsequent months. Further, funds' choice to recall loans and sell stocks is predictive of future negative returns. We do not find similar patterns for index funds, which are limited in what securities they can buy and sell, given their investment mandate.

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<sup>32</sup>The exact calculation being  $0.0285 * Ln(1.10) = 0.0027$

<sup>33</sup>Here we use heteroskedasticity-robust standard errors as we only have a single cross-section for analysis.

In addition to the individual lending decisions of active funds, their behavior as a group has important implications for the aggregate supply of stock loans. First, active funds are a meaningful source of stock lending. Second, information factors frequently drive their entry and exit from the lending market rather than just liquidity, tax, or institutional reasons. Insofar as stocks with strong disagreement among investors are more likely to be short-sale constrained, their entry and exit can meaningfully shift the supply curve of lending for these stocks. While their decision to recall loans of these stocks may exacerbate short-sale constraints, their likely concurrent sale of existing long positions in these stocks helps transmit the short-sellers information to the larger equity market.

In light of our findings, a larger question remains: why do the majority of funds choose not to participate in the lending market? If active funds can avoid large losses by being selective in lending and recall decisions, participation in the lending market appears to be a viable avenue to both gain additional revenue and receive meaningful signals about future returns. Our fund performance results suggest there might exist a separating equilibrium. Funds that choose to lend are those that can make informed participation decisions. Funds whose investment strategy does not involve such information decide not to lend. Whether limited participation in the lending market is an endogenous result arising from differing information sets or is driven by regulatory restrictions or other non-information frictions deserves further study. Clearly, the source of limited participation is important for designing optimal policy in the shorting market and to better understand the effects of short sales in general

## 2.7 Tables

Table 2.1: Active Funds: Lending Versus Non-Lending

This table reports various characteristics of actively managed U.S. domestic equity mutual funds (active funds) at the end of 2007. *Lending Active Funds* include those that lend at least one stock during the period of 2006Q3-2007Q4 and have detailed stock lending data available from their SEC filings. *Non-Lending Active Funds* include other active funds covered by CRSP. All active funds must have at least \$10 million total net assets and be at least two years old. Please refer to Appendix A for the other variable definitions. The rightmost column reports difference in means between the two groups. \*\*\*, \*\*, \* indicate significance at the 1%, 5%, and 10% levels, respectively.

	Lending Active Funds				Non-Lending Active Funds				Difference
	No.	Mean	SD	Median	No.	Mean	SD	Median	
TNA (\$Mil)	348	2541.30	6258.03	447.75	1,695	1144.47	6212.12	162.70	1302.37***
Expense Ratio (%)	348	1.13	0.35	1.13	1,695	1.29	0.86	1.22	-0.15***
Port Turnover	348	0.85	0.57	0.74	1,695	0.88	1.12	0.63	-0.03
Fund Annual Return	348	0.07	0.09	0.06	1,695	0.06	0.09	0.06	0.01**
Fund Monthly FF4 Alpha in Previous Year (%)	348	-0.23	0.38	-0.20	1,695	-0.20	0.95	-0.16	-0.03
Fund Age	348	14.34	12.47	11.00	1,695	11.03	12.58	8.00	3.31***
Family TNA (\$Mil)	348	83965.13	154755.61	18627.10	1,695	22137.06	58112.28	5830.40	61828.07***
Active Share	330	0.75	0.16	0.76	1,321	0.78	0.15	0.80	-0.03***

Table 2.2: Active Funds' Stock Lending Activities

This table reports the summary information of stock lending activities of active funds during the period of 2006Q3-2007Q4. Panel A reports the fund-level lending activities at the end of each quarter. Panel B reports the lending activities at the stock level.

**Panel A. Active Funds' Stock Lending Activities**

	Fund- Quarter Obs.	Mean	SD	Median	Min	25th	75th	Max
No. of Stocks on Loan per Portfolio	945	29.78	51.51	13.00	1.00	5.00	33.00	425.00
No. of Stocks on Loan per Portfolio/Total No. of Stocks in Portfolio	945	0.20	0.19	0.14	0.00	0.05	0.32	0.89
Total Amount of Stocks on Loan Per Portfolio (\$Mil)	493	115.15	269.91	31.98	0.08	8.07	110.73	3252.31
Total Amount of Stocks on Loan/TNA	493	0.14	0.06	0.12	0.00	0.05	0.17	0.24
Average amount per Stock on Loan (\$Mil)	493	5.55	25.38	0.50	0.00	0.13	1.96	243.73
Total Weight of Stocks on Loan in Portfolio	945	0.21	0.18	0.15	0.00	0.06	0.31	0.86
Total \$ Position of Stocks on Loan Per Portfolio (\$Mil)	945	275.27	705.38	50.34	0.14	11.54	244.11	9140.45

**Panel B. Number of Lending Funds Per Stock**

Sample includes all stocks held by active funds that lend								
	No. of Stock- Quarters	Mean	SD	Median	Min	25th	75th	Max
No. of Lending Funds Per Stock	15,880	1.87	2.55	1.00	0.00	0.00	3.00	28.00
Sample includes all stocks lent by active funds								
	No. of Stock- Quarters	Mean	SD	Median	Min	25th	75th	Max
No. of Lending Funds Per Stock on Loan	9,806	3.02	2.66	2.00	1.00	1.00	4.00	28.00

Table 2.3: Active Funds' Stock Lending and Aggregate Stock Loan Supply

This table examines whether active funds contribute to the total stock loan supply in the shorting market. The sample includes all stocks that are held by active funds during the period of 2006Q3-2007Q4. The dependent variable *Stock Loan Supply* is the ratio of total lendable shares to the total shares outstanding. The key independent variable *No. of Active Funds Lending* is the number of active funds that lend stock  $i$  in quarter  $t$ . Please refer to Appendix A for the other variable definitions. All variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. T-statistics, reported in parentheses, are based on standard errors clustered at the stock level. \*\*\*, \*\*, \* indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	Dep. Variable = Stock Loan Supply <sub><i>i,t</i></sub>		
	(1)	(2)	(3)
No. of Active Funds Lending <sub><i>i,t</i></sub>	0.0179*** (26.42)	0.0084*** (13.00)	0.0024*** (5.02)
Log Size <sub><i>i,t-1</i></sub>		-0.0101*** (-5.89)	-0.0045*** (-3.33)
MB Ratio <sub><i>i,t-1</i></sub>		-0.0044*** (-6.88)	-0.0041*** (-7.88)
3-Month Past Return <sub><i>i,t-1</i></sub>		-0.0325*** (-5.35)	-0.0395*** (-8.26)
12-Month Past Return <sub><i>i,t-1</i></sub>		0.0058 (1.32)	0.0006 (0.18)
ROA <sub><i>i,t-1</i></sub>		0.0748*** (5.67)	0.0379*** (3.79)
Sales Growth <sub><i>i,t-1</i></sub>		-0.0608*** (-8.68)	-0.0255*** (-4.37)
Amihud Ratio <sub><i>i,t-1</i></sub>		-0.0674*** (-9.79)	-0.0247*** (-7.90)
Stock Turnover <sub><i>i,t-1</i></sub>		0.0265*** (17.11)	0.0026** (2.00)
Return Volatility <sub><i>i,t-1</i></sub>		-0.7029*** (-14.94)	-0.3061*** (-8.65)
No. of Analysts <sub><i>i,t-1</i></sub>		0.0004 (1.02)	-0.0004 (-1.18)
Analyst Dispersion <sub><i>i,t-1</i></sub>		-0.0526*** (-9.35)	-0.0455*** (-9.47)
Institutional Ownership <sub><i>i,t</i></sub>			0.3171*** (50.13)
Quarter FE	Yes	Yes	Yes
Observations	13,690	11,783	11,783
R-squared	0.13	0.28	0.61

Table 2.4: Selected Index Funds that Lend Stocks

This table focuses on a group of selected index funds that lend stocks. The sample period is 2006Q3-2007Q4. Panel A reports the fund-level lending activities at the end of each quarter. Panel B reports the lending activities at the stock level. Please refer to the Internet Appendix for the complete list of the 35 selected index funds.

**Panel A. Selected Index Funds' Stock Lending Activities**

	No. of Fund-Quarters	Mean	SD	Median	Min	25th	75th	Max
No. of Stocks on Loan Per Portfolio	106	196.47	310.66	86.50	1.00	11.00	156.00	1459.00
No. of Stocks on Loan Per Portfolio/Total No. of Stocks in Portfolio	106	0.17	0.17	0.13	0.00	0.03	0.28	0.79
Total Amount of Stocks on Loan Per Portfolio (\$Mil)	19	73.63	103.26	29.35	0.36	17.54	108.94	385.20
Total Amount of Stocks on Loan/TNA	19	0.10	0.08	0.07	0.00	0.04	0.16	0.28
Average Amount per Stock on Loan (\$Mil)	19	0.55	0.58	0.30	0.07	0.10	0.30	2.00
Total Weight of Stocks on Loan in Portfolio	106	0.13	0.15	0.06	0.00	0.02	0.18	0.76
Total \$ Position of Stocks on Loan Per Portfolio (\$Mil)	106	316.81	588.66	48.79	0.30	18.24	239.91	3439.11

**Panel B. Number of Selected Index Lending Funds Per Stock**

Sample includes all stocks held by selected index funds that lend								
	No. of Stock-Quarters	Mean	SD	Median	Min	25th	75th	Max
No. of Lending Funds Per Stock	13,067	0.37	0.73	0	0	0	1	6
Sample includes all stocks lent by selected index funds								
	No. of Stock-Quarters	Mean	SD	Median	Min	25th	75th	Max
No. of Lending Funds Per Stock on Loan	3,508	1.39	0.75	1	1	1	2	6

Table 2.5: Characteristics of Stocks Held by Lending Funds

This table reports the summary statistics of various stock characteristics included in the empirical analysis. Please refer to Appendix A for the definitions of these variables. All variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. The rightmost column reports the difference in means between the two groups. \*\*\*, \*\*, \* indicate significance at the 1%, 5%, and 10% levels, respectively.

	Stocks held by the active funds that lend				Stocks held by the selected index funds that lend				Difference
	No. of Stock-Quarters	Mean	SD	Median	No. of Stock-Quarters	Mean	SD	Median	
<b>Stock-Level Variables</b>									
Log Size	15,816	13.85	1.70	13.72	22,611	13.45	1.76	13.29	0.40***
MB Ratio	15,445	3.17	3.45	2.14	21,838	3.25	3.68	2.14	-0.08**
3-Month Prior Return	15,824	0.02	0.18	0.02	22,623	0.01	0.19	0.00	0.01***
12-Month Prior Return	15,847	0.15	0.40	0.10	22,645	0.11	0.41	0.06	0.04***
ROA	15,743	0.10	0.15	0.11	22,499	0.06	0.20	0.09	0.04***
Sales Growth	15,681	0.12	0.23	0.10	22,280	0.12	0.28	0.10	0.00
Amihud Ratio	15,829	0.11	0.55	0.00	22,629	0.23	1.00	0.00	-0.12***
Turnover	15,851	0.19	0.15	0.15	22,650	1.79	1.56	1.38	-1.60***
Return Volatility	15,840	0.09	0.05	0.08	22,635	0.10	0.06	0.09	-0.01***
No. of Analysts	15,880	7.34	6.12	6.00	22,695	6.34	5.99	5.00	1.00***
Analyst Dispersion	13,255	0.10	0.24	0.03	17,234	0.11	0.27	0.03	-0.01***
Institutional Ownership	15,840	0.70	0.27	0.74	17,424	0.64	0.30	0.69	0.06***
Short Interest	15,777	0.06	0.06	0.04	19,712	0.06	0.06	0.04	0.00*
Stock Loan Supply	14,067	0.22	0.12	0.23	22,557	0.20	0.12	0.20	0.02***
Stock Loan Fee ( $\times 100$ )	14,088	0.79	1.48	0.43	19,777	1.16	2.26	0.43	-0.37***
<b>Fund-Stock Level Variables</b>									
Near Div. Record	133,745	0.06	0.25	0.00	131,485	0.03	0.18	0.00	0.03***
Near Vote Record	133,745	0.01	0.11	0.00	131,485	0.01	0.08	0.00	0.00***
Portfolio Weight ( $\times 100$ )	133,745	0.82	1.81	0.42	131,485	0.10	0.25	0.04	0.72***
Ownership in Firm ( $\times 100$ )	133,745	0.36	1.06	0.05	131,485	0.18	0.40	0.02	0.18***

Table 2.6: Which Stocks to Lend? Evidence On Equity Funds' Stock Lending Decisions

This table reports the OLS regression results regarding an equity fund's stock lending decision. The sample used in Columns (1)-(4) includes all stocks held by the active funds that participate in stock lending during 2006Q3-2007Q4, whereas the sample used in Columns (6)-(9) includes all stocks held by the selected index funds that participate in stock lending in the same period. Columns (5) and (10) include only the stocks that are held by both the active and index funds. The dependent variable *On Loan Dummy* equals one if fund  $f$  lends stock  $i$  at the end of quarter  $t$ , zero otherwise. Please refer to Appendix A for the other variable definitions. All variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. T-statistics, reported in parentheses, are based on standard errors clustered at the fund level. \*\*\*, \*\*, \* indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	Dep. Variable = On Loan Dummy <sub>f,t</sub>									
	Active Funds					Selected Index Funds				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log Size <sub>i,t-1</sub>	-0.0499*** (-8.64)	-0.0574*** (-9.68)	-0.0562*** (-9.47)	-0.0303*** (-5.30)	-0.0304*** (-5.33)	-0.0246 (-1.67)	-0.0304 (-1.65)	-0.0286 (-1.56)	-0.0087 (-0.57)	-0.0102 (-0.64)
MB Ratio <sub>i,t-1</sub>	0.0060*** (5.99)	0.0059*** (5.98)	0.0058*** (5.78)	0.0035*** (3.65)	0.0035*** (3.68)	0.0049*** (3.64)	0.0047*** (3.54)	0.0040*** (2.88)	0.0019* (1.98)	0.0019* (1.80)
Sales Growth <sub>i,t-1</sub>	0.1015*** (7.11)	0.0923*** (6.47)	0.0966*** (6.72)	0.0745*** (5.41)	0.0751*** (5.41)	0.0192 (1.13)	0.0134 (0.82)	0.0036 (0.23)	-0.0123 (-0.89)	-0.0127 (-0.88)
3-Month Past Ret. <sub>i,t-1</sub>	-0.0072 (-0.34)	-0.0020 (-0.10)	-0.0056 (-0.27)	-0.0185 (-0.89)	-0.0195 (-0.92)	0.0438* (1.75)	0.0447* (1.77)	0.0395 (1.43)	0.0314 (1.24)	0.0342 (1.33)
12-Month Past Ret. <sub>i,t-1</sub>	-0.0163 (-1.24)	-0.0188 (-1.46)	-0.0098 (-0.75)	0.0128 (1.01)	0.0129 (1.00)	-0.0508*** (-5.39)	-0.0509*** (-5.08)	-0.0437*** (-3.95)	-0.0270*** (-2.95)	-0.0297*** (-3.16)
ROA <sub>i,t-1</sub>	-0.0864*** (-3.09)	-0.0848*** (-3.06)	-0.0797*** (-2.85)	-0.0165 (-0.59)	-0.0162 (-0.58)	-0.1258*** (-3.58)	-0.1206*** (-3.43)	-0.0900** (-2.29)	-0.0646** (-2.15)	-0.0639** (-2.22)
Stock Turnover <sub>i,t-1</sub>	0.0270*** (8.83)	0.0271*** (8.93)	0.0252*** (8.24)	-0.0119*** (-3.78)	-0.0122*** (-3.86)	0.0361*** (5.58)	0.0385*** (6.50)	0.0367*** (6.30)	0.0026 (0.82)	0.0028 (0.90)
Amihud Ratio <sub>i,t-1</sub>	-1.0747*** (-6.00)	-1.1122*** (-6.27)	-1.2781*** (-7.69)	-0.4521*** (-2.99)	-0.5365** (-2.43)	-0.2053*** (-2.85)	-0.2083*** (-2.89)	-0.2375*** (-3.23)	-0.1118** (-2.12)	-0.2186* (-1.86)
Return Volatility <sub>i,t-1</sub>	0.1469 (1.33)	0.1340 (1.21)	0.0465 (0.41)	0.2303** (2.05)	0.2453** (2.14)	-0.1469 (-1.00)	-0.2286* (-1.79)	-0.3142*** (-2.81)	-0.0511 (-0.51)	-0.0560 (-0.54)
No. of Analysts <sub>i,t-1</sub>	-0.0012** (-2.41)	-0.0011** (-2.33)	-0.0007 (-1.34)	0.0007 (1.39)	0.0007 (1.47)	-0.0027*** (-4.09)	-0.0029*** (-4.74)	-0.0027*** (-4.44)	-0.0014** (-2.19)	-0.0013** (-2.08)
Analyst Dispersion <sub>i,t-1</sub>	0.1139*** (5.78)	0.1148*** (5.89)	0.1059*** (4.87)	0.0235 (1.18)	0.0215 (1.06)	0.0388*** (3.39)	0.0378*** (3.06)	0.0259** (2.60)	0.0056 (0.60)	0.0054 (0.59)
Near Div. Record <sub>f,t</sub>	-0.0309*** (-2.81)	-0.0287*** (-2.63)	-0.0277** (-2.55)	-0.0288*** (-2.64)	-0.0294*** (-2.71)	-0.0338 (-1.01)	-0.0383 (-1.18)	-0.0372 (-1.17)	-0.0412 (-1.31)	-0.0427 (-1.36)
Near Vote Record <sub>f,t</sub>	-0.0645*** (-4.61)	-0.0634*** (-4.63)	-0.0560*** (-4.19)	-0.0502*** (-3.89)	-0.0504*** (-3.89)	-0.0477 (-1.29)	-0.0523 (-1.43)	-0.0570 (-1.63)	-0.0571 (-1.65)	-0.0567 (-1.63)
Portfolio Weight <sub>i,t-1</sub>		3.7753*** (6.77)	3.8551*** (6.94)	3.5546*** (6.43)	3.5844*** (6.35)		6.0725 (0.84)	5.3045 (0.74)	2.7656 (0.39)	2.9315 (0.42)
Ownership in Firm <sub>f,i,t-1</sub>		-1.2901 (-1.25)	-1.2260	-1.3652 (-1.29)	-1.3328 (-1.24)		-22.9263*** (-2.76)	-22.6559**	-21.6394**	-23.1922***
Stock Loan Fee <sub>i,t-1</sub>			6.0507*** (14.75)	8.5843*** (5.21)	8.5995*** (5.15)			2.5245*** (4.54)	1.6201 (1.31)	1.0330 (0.79)
Sq. Stock Loan Fee <sub>i,t-1</sub>				-98.3622*** (-4.69)	-99.2466*** (-4.63)				-9.8494 (-1.23)	-4.0508 (-0.35)
Short Interest <sub>i,t</sub>				2.4952*** (22.03)	2.4925*** (21.94)				1.8314*** (4.59)	1.8123*** (4.62)
Stock Loan Supply <sub>i,t</sub>				-0.3140*** (-6.78)	-0.3139*** (-6.70)				-0.2571** (-2.38)	-0.2682** (-2.47)
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	122,422	122,422	109,980	109,980	108,627	106,308	106,308	95,051	95,051	93,501
R-squared	0.09	0.09	0.10	0.15	0.15	0.06	0.08	0.09	0.13	0.13

Table 2.7: Future Performance of Stocks On Loan

This table reports the future returns of stocks that are on loan and those that are not on loan from active funds. A stock is “on loan” at the end of quarter  $t$  if at least one active fund lends it in that quarter. Otherwise, a stock is not on loan. Panel A reports the mean returns of these two types of stocks over next 1, 3, 6, and 12 months. Panel B reports the OLS regression results on the predictive effect of stock lending on future stock returns. In Panel B, the independent variable *Stock On Loan Dummy* equals one if a stock is on loan from one or more active funds in quarter  $t$ , and zero otherwise. The independent variable *No. of Funds Lending* is the number of actively managed funds lending a stock in quarter  $t$ . Panel C repeats the same analysis but focuses on the sample of index funds. The independent variable *Stock On Loan Dummy* in Panel C equals one if a stock is on loan from one or more index funds in quarter  $t$ , and zero otherwise. The independent variable *No. of Funds Lending* in Panel C is the number of index funds lending a stock in quarter  $t$ . Please refer to Appendix A for the other variable definitions. All variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. T-statistics, reported in parentheses, are based on standard errors clustered at the stock level. \*\*\*, \*\*, \* indicate significance at the 1%, 5%, and 10% levels, respectively.

**Panel A. On Loan Versus Not On Loan**

	No. of Stock-Quarters	Return over			
		Next 1M	Next 3M	Next 6M	Next 12M
(1) Stocks On Loan	7,475	-0.0018	-0.0179	-0.0521	-0.1576
(2) Stocks Not On Loan	6,215	-0.0196	-0.0361	-0.0608	-0.2252
Dif: (1) – (2)		0.0178***	0.0182***	0.0088*	0.0676***
T-statistic		(8.76)	(5.45)	(1.79)	(10.10)

**Panel B. Future Performance of Stocks On Loan from Active Funds**

	Return over				Return over			
	Next 1M	Next 3M	Next 6M	Next 12M	Next 1M	Next 3M	Next 6M	Next 12M
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stock On Loan Dummy <sub>i,t</sub>	0.0064***	0.0049	0.0027	0.0101				
	(2.98)	(1.37)	(0.48)	(1.19)				
No. of Funds Lending <sub>i,t</sub>					0.0019***	0.0019**	0.0029*	-0.0002
					(3.48)	(1.98)	(1.69)	(-0.09)
Log Size <sub>i,t</sub>	0.0024***	0.0069***	0.0138***	0.0206***	0.0022***	0.0067***	0.0129***	0.0214***
	(4.34)	(6.65)	(7.07)	(6.59)	(4.02)	(6.36)	(6.62)	(6.90)
BM <sub>i,t</sub>	-0.0023	-0.0205***	-0.0632***	-0.1126***	-0.0023	-0.0205***	-0.0630***	-0.1129***
	(-0.57)	(-2.84)	(-4.79)	(-5.37)	(-0.56)	(-2.83)	(-4.78)	(-5.38)
Return <sub>i,t-12,t-1</sub>	0.0026	0.0217***	0.0397***	0.0250*	0.0023	0.0214***	0.0390***	0.0254*
	(0.88)	(4.32)	(4.36)	(1.91)	(0.77)	(4.25)	(4.28)	(1.94)
Short Interest <sub>i,t</sub>	-0.0840***	-0.1996***	-0.3811***	-0.4469***	-0.0908***	-0.2098***	-0.4098***	-0.4175***
	(-4.38)	(-5.68)	(-6.04)	(-4.64)	(-4.72)	(-5.92)	(-6.42)	(-4.27)
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,690	13,690	13,690	13,690	13,690	13,690	13,690	13,690
R-squared	0.11	0.10	0.13	0.13	0.11	0.10	0.13	0.13

**Panel C. Future Performance of Stocks On Loan from Selected Index Funds**

	Return over				Return over			
	Next 1M	Next 3M	Next 6M	Next 12M	Next 1M	Next 3M	Next 6M	Next 12M
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stock On Loan Dummy <sub>i,t</sub>	-0.0094***	-0.0056	-0.0037	-0.0054				
	(-4.52)	(-1.48)	(-0.64)	(-0.65)				
No. of Funds Lending <sub>i,t</sub>					-0.0057***	-0.0024	0.0005	-0.0014
					(-4.28)	(-0.99)	(0.15)	(-0.25)
Log Size <sub>i,t</sub>	0.0017***	0.0089***	0.0176***	0.0277***	0.0017***	0.0089***	0.0175***	0.0276***
	(3.27)	(9.37)	(9.77)	(9.63)	(3.35)	(9.35)	(9.70)	(9.60)
BM <sub>i,t</sub>	-0.0056	-0.0122*	-0.0413***	-0.0786***	-0.0054	-0.0119*	-0.0410***	-0.0783***
	(-1.44)	(-1.74)	(-3.30)	(-4.01)	(-1.39)	(-1.71)	(-3.27)	(-4.00)
Return <sub>i,t-12,t-1</sub>	0.0018	0.0238***	0.0442***	0.0420***	0.0018	0.0239***	0.0445***	0.0422***
	(0.65)	(4.97)	(5.00)	(3.35)	(0.63)	(4.99)	(5.04)	(3.37)
Short Interest <sub>i,t</sub>	-0.0548***	-0.1581***	-0.3305***	-0.3925***	-0.0514***	-0.1612***	-0.3438***	-0.4008***
	(-2.95)	(-4.67)	(-5.43)	(-4.25)	(-2.72)	(-4.66)	(-5.56)	(-4.29)
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,322	15,322	15,322	15,322	15,322	15,322	15,322	15,322
R-squared	0.10	0.10	0.13	0.12	0.10	0.10	0.13	0.12

Table 2.8: Describing the Recall Activities

This table reports the status of stock  $i$  that is on loan from fund  $f$  at the end of quarter  $t$  over the next four quarters. The sample includes all stocks that are on loan from funds that lend at the end of quarter  $t$ . For each fund at the end of quarter  $t+q$  ( $q=1,2,3,4$ ), we compute the percentage of stocks that continue to be on loan, are recalled, or are totally liquidated, respectively. Panel A reports the mean values of these percentages across all active funds that lend at the end of quarter  $t$ . Panel B reports the mean values of these percentages across the selected index funds that lend at the end of quarter  $t$ . Stock  $i$  “remains on loan” at the end of quarter  $t+q$  from fund  $f$  if it is on loan in both quarters. Stock  $i$  is “recalled” by fund  $f$  at the end of  $t+q$  if it was on loan in quarter  $t$ , but is not on loan at the end of quarter  $t+q$ . Stock  $i$  is “totally liquidated” by fund  $f$  at the end of  $t+q$  if it was on loan in quarter  $t$ , but completely sold at the end of quarter  $t+q$ .

**Panel A. Stocks On Loan at the end of quarter  $t$  by Active Funds**

Stocks that are On Loan at the end of $t$	$q=1$	$q=2$	$q=3$	$q=4$
On Loan at $t+q$	38.19%	14.33%	4.44%	0.12%
Recalled at $t+q$	42.62%	30.00%	12.88%	5.15%
Totally Liquidated at $t+q$	19.19%	55.67%	82.67%	94.73%

**Panel B. Stocks On Loan at the end of quarter  $t$  by Selected Index Funds**

Stocks that are On Loan at the end of $t$	$q=1$	$q=2$	$q=3$	$q=4$
On Loan at $t+q$	37.77%	35.80%	18.01%	33.01%
Recalled at $t+q$	58.42%	59.70%	73.98%	53.72%
Totally Liquidated at $t+q$	3.81%	4.50%	8.01%	13.27%

Table 2.9: Future Returns of the Recalled Stocks

This table reports the future returns of recalled stocks and those that are not recalled. Panel A reports the mean returns of these two groups of stocks over the next 1, 3, 6, and 12 months. We define “recalled” stocks in two ways. First, we define a “recalled stock” as one that is recalled by at least one fund at the end of quarter  $t$ . Second, we define a “recalled stock” as one that has more funds recalling it than funds lending it at the end of quarter  $t$ . Panels B and C report the OLS regression results on the predictive effect of stock recalls on future stock returns for active funds and selected index funds, respectively. The key independent variable, *Recall/On Loan Ratio*, is the ratio of number of funds that recall a stock to the number of funds that lend a stock at the end of quarter  $t$ . The variable uses active funds in Panel B and selected index funds in Panel C. Please refer to Appendix A for the other variable definitions. All variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. T-statistics, reported in parentheses, are based on standard errors clustered at the stock level. \*\*\*, \*\*, \* indicate significance at the 1%, 5%, and 10% levels, respectively.

**Panel A. Future Returns: Univariate Analysis**

	No. of Stock-Quarters	Return over			
		Next 1M	Next 3M	Next 6M	Next 12M
(1) Stocks Recalled (if a stock is recalled by any fund)	3,376	-0.0219	-0.0517	-0.0937	-0.2508
(2) Stocks On Loan (if a stock is not recalled by any fund and on loan from any fund)	1,849	-0.0087	-0.0271	-0.0916	-0.2012
Dif: (1) – (2)		-0.0132***	-0.0246***	-0.0022	-0.0497***
T-statistic		(-4.84)	(-5.55)	(-0.33)	(-5.87)
(1) Stocks Recalled (if more recalled than on loan)	1,784	-0.0371	-0.0698	-0.0920	-0.2948
(2) Stocks On Loan (if more on loan than recalled)	3,441	-0.0065	-0.0282	-0.0934	-0.1996
Dif: (1) – (2)		-0.0306***	-0.0416***	0.0014	-0.0952***
T-statistic		(-11.00)	(-9.22)	(0.21)	(-11.06)

**Panel B. Future Returns of Stocks Recalled by Active Funds (only includes stocks that are either on loan or recalled)**

	Return over			
	Next 1M (1)	Next 3M (2)	Next 6M (3)	Next 12M (4)
Recall/On Loan Ratio <sub><i>i,t</i></sub>	-0.0081** (-2.28)	-0.0079* (-1.78)	0.0031 (0.35)	-0.0097 (-0.86)
Log Size <sub><i>i,t</i></sub>	0.0045*** (5.36)	0.0094*** (6.26)	0.0162*** (5.86)	0.0215*** (5.37)
BM <sub><i>i,t</i></sub>	-0.0081 (-1.41)	-0.0304*** (-3.05)	-0.0741*** (-4.07)	-0.0822*** (-3.10)
Return <sub><i>i,t-12,t-1</i></sub>	-0.0008 (-0.20)	0.0193*** (2.89)	0.0374*** (3.11)	-0.0057 (-0.36)
Short Interest <sub><i>i,t</i></sub>	-0.0404* (-1.65)	-0.1776*** (-4.12)	-0.3852*** (-5.08)	-0.3670*** (-3.39)
Quarter FE	Yes	Yes	Yes	Yes
Observations	5,225	5,225	5,225	5,225
R-squared	0.12	0.10	0.09	0.08

**Panel C. Future Returns of Stocks Recalled by Index Funds (only includes stocks that are either on loan or recalled)**

	Return over			
	Next 1M (1)	Next 3M (2)	Next 6M (3)	Next 12M (4)
Recall/On Loan Ratio <sub><i>i,t</i></sub>	0.0071* (1.86)	0.0114* (1.66)	0.0113 (1.19)	0.0068 (0.54)
Log Size <sub><i>i,t</i></sub>	0.0037*** (2.90)	0.0053** (2.26)	0.0124*** (3.12)	0.0236*** (4.18)
BM <sub><i>i,t</i></sub>	-0.0351*** (-4.63)	-0.0833*** (-5.79)	-0.1365*** (-5.74)	-0.1041*** (-3.03)
Return <sub><i>i,t-12,t-1</i></sub>	0.0228*** (3.81)	0.0476*** (4.53)	0.0587*** (3.50)	0.0353 (1.52)
Short Interest <sub><i>i,t</i></sub>	-0.0529* (-1.72)	-0.1754*** (-3.25)	-0.3497*** (-3.83)	-0.4987*** (-3.71)
Quarter FE	Yes	Yes	Yes	Yes
Observations	4,401	4,401	4,401	4,401
R-squared	0.13	0.09	0.10	0.04

Table 2.10: Lending Funds' Selling Decisions

This table examines whether active funds' selling activities respond to the information in the stock loan market using an OLS model. The dependent variable *Sell Dummy* equals one if fund  $f$  reduces or liquidates its position in stock  $i$  at the end of quarter  $t$ , zero otherwise. Columns (1)-(3) examine the active funds' selling decisions. Columns (4)-(6) examine the selected index funds' selling decisions. Please refer to Appendix A for the other variable definitions. All variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. T-statistics, reported in parentheses, are based on standard errors clustered at the fund level. \*\*\*, \*\*, \* indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	Dep. Variable = Sell Dummy <sub>f,i,t</sub>					
	Actively Managed Funds			Selected Index Funds		
	(1)	(2)	(3)	(4)	(5)	(6)
Recall Dummy <sub>f,i,t</sub>	0.1894*** (10.25)	0.1865*** (10.11)	0.1823*** (9.93)	0.1451** (2.64)	0.1444*** (2.82)	0.1413** (2.62)
Log Size <sub>i,t-1</sub>	-0.0356*** (-7.63)	-0.0336*** (-6.94)	-0.0343*** (-7.03)	-0.0224* (-1.72)	-0.0226* (-1.76)	-0.0221 (-1.70)
BM <sub>i,t-1</sub>	-0.0916*** (-4.69)	-0.0883*** (-4.67)	-0.0928*** (-4.87)	0.0012 (0.06)	0.0017 (0.08)	0.0004 (0.02)
12-Month Past Return <sub>i,t-1</sub>	0.0046 (0.41)	0.0051 (0.46)	0.0026 (0.23)	0.0177 (0.97)	0.0181 (1.02)	0.0182 (0.98)
Short Interest <sub>i,t-1</sub>		0.1345* (1.89)	0.1251 (1.60)		-0.0104 (-0.06)	-0.0317 (-0.15)
Stock Loan Fee <sub>i,t-1</sub>			-0.0840 (-0.29)			0.3092 (0.66)
Change in Stock Loan Fee <sub>i,t</sub>			1.7273*** (3.05)			0.0459 (0.15)
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	145,377	145,176	130,097	58,157	58,067	51,306
R-squared	0.03	0.03	0.03	0.07	0.07	0.07

Table 2.11: Stock Lending and Fund Performance

This table examines the relationship between active funds' stock lending activities and their performance. The sample includes all active funds at the end of 2007. The dependent variable is the four-factor adjusted monthly alpha for 2007. The independent variable *Lending Dummy* equals one if a fund participates in stock lending at least once in the period of 2007Q1-2007Q4, and zero otherwise. *Log(No. of Stocks Lent)* is the natural logarithm of the number of stocks lent by a fund in 2007. Please refer to Appendix A for the other variable definitions. All variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. T-statistics, reported in parentheses, are based on heteroskedastic-robust standard errors. \*\*\*, \*\*, \* indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	Dep. Variable = Four-Factor Alpha <sub>it</sub>	
	All Active Funds in 2007 (1)	Lending Active Funds in 2007 (2)
Lending Dummy <sub>it</sub>	0.0099 (0.34)	
Log(No. of Stocks Lent) <sub>it</sub>		0.0285* (1.71)
Log(Fund Size) <sub>it-1</sub>	0.0060 (0.73)	0.0165 (0.83)
Log(Fund Family Size) <sub>it-1</sub>	0.0039 (0.62)	0.0103 (0.73)
Expense Ratio <sub>it-1</sub>	3.6930 (1.03)	-0.7029 (-0.08)
Portfolio Turnover <sub>it-1</sub>	0.1005*** (4.73)	0.0691* (1.66)
Fund Flow <sub>it-1</sub>	0.0857*** (3.48)	0.2715*** (3.80)
Four-Factor Alpha <sub>it-1</sub>	0.2129*** (5.61)	0.1868** (2.26)
Active Share <sub>it-1</sub>	0.6696*** (9.62)	0.7851*** (5.16)
Observations	1,651	330
R-squared	0.15	0.23

# Appendices

# Appendix A

## Chapter 1 Appendix

Table A.1: Variable Definitions

Variable	Definition
<i>A. Proposal variables</i>	
Vote Result	Dummy variable that equals one if the proposal is passed, zero otherwise.
ISS with MGMT	Dummy variable that equals one if Institutional Shareholder Service recommends voting with management.
Non-incentive dummy	Dummy variable that equals one if the nature of the proposal is not about stocks, options or any incentive plans.
SOP dummy	Dummy variable that equals one if the proposal is advisory Say-On-Pay proposal.
<i>B. Fund characteristics/variables</i>	
TNA	The total net assets under fund's management.
Fraction as TNA	The value of a fund's holdings in a certain firm as a percentage of its total asset.
Fraction as equity	The value of a fund's holdings in a certain firm as a percentage of the firm's total equity.
Fundvote with MGMT	Dummy that equals one if fund votes the same as management recommends, zero otherwise.
n_funds_voted	Number of total fund votes on a certain proposal.
n_funds_against	Number of funds that vote against on a certain proposal.
pct_funds_against	Ratio: n_against over n_votes.
pct_shares_against	Holding adjusted version of pct_funds_against.
avg_pct_funds_against	Average pct_funds_against in a given firm year.
avg_pct_shares_against	Average pct_shares_against in a given firm year.
<i>C. Firm characteristics</i>	
AT	Total assets AT.
Ret	Annual return on stock.
ROA	Return on asset NI/AT.
BM	Book to market ratio BKVLP5/MKVALT.
Leverage	Book leverage as total debt divided by market value of equity (DLTT+DLC)/SEQ.
IO fraction	Institutional ownership as a percentage of equity.
EINDEX	Entrenchment index : See <a href="#">Bebchuk et al. [2009]</a> .
Support Rate	average fraction of "For" voting shares for the firm-year.
<i>D. Board controls</i>	
Independent director ratio	Number of independent directors on board divided by board size.
Board size	Number of total directors on board.
Has female	Dummy that equals one if board has female.
Director tenure	Average number of years that director has served on board.
Director ownership	Total director ownership.
<i>E. Executive compensation</i>	
CEO compensation	CEO total compensation (in thousands).
Salary	Dollar value of the base salary earned by the named executive officer during the fiscal year (in thousands).
Bonus	Dollar value of a bonus earned by the named executive officer during fiscal year (in thousands).
Option awards	Dollar value of option-related awards (e.g. options, stock appreciation rights, and other instruments with option-like features, in thousands).
Stock awards	Dollar value of stock-related awards (e.g. restricted stock, restricted stock units, phantom stock, phantom stock units, common stock equivalent units etc.) that do not have option-like features (in thousands).
Excess pay	Component of CEO compensation that cannot be explained by lagged firm characteristics
Predicted pay	Component of CEO compensation predicted by lagged firm characteristics

Table A.2: Compensation related proposals and ISS item code

General Description	ISS ID	# of Proposals	Note
<i>1. Key word: COMPENSATION</i>			(13218/310662)
Advisory vote to ratify named executive officer's compensation	M0550	12938	
Company specific compensation related	M0547	122	
Approve/amend deferred compensation plan	M0538	117	
Approve/amend bundle compensation plan	M0558	34	
Approve increase in aggregate compensation ceiling for directors	M0588	4	
Amend articles/charter compensation related	M0595	3	
<i>2. Key word: PAY</i>			(3426/310662)
Advisory vote on say on pay freq	M0552	3422	
Bundled say on pay/golden parachute advisory vote	M0559	2	
Amend terms of severance payments to executives	M0581	2	
<i>3. Key word: STOCK PLAN</i>			(10666/310662)
Amend omnibus stock plan	M0524	6506	
Approve omnibus stock plan	M0522	3897	
Amend restricted stock plan	M0509	136	
Approve restricted stock plan	M0507	127	
<i>4. Key word: BONUS PLAN</i>			(2627/310662)
Approve/Amend executive incentive bonus plan	M0535	2618	
Approve stock for salary bonus plan	M0556	9	
<i>5. Key word: OPTION</i>			(1194/310662)
Amend Stock Option Plan	M0503	620	
Approve Stock Option Plan	M0501	263	
Approve Repricing of Options	M0548	215	
Approve Stock Option Plan Grants	M0555	77	
Approve Incentive Stock Option Plan	M0504	9	
Amend Incentive Stock Option Plan	M0506	5	
Approve/Amend All Employee Option Schemes	M0551	3	
Amend Terms of Outstanding Options	M0368	1	
Approve Issuance of Shares Pursuant to the Share Option Scheme	M0592	1	
<i>6. Key word: Award or Grant not covered by above</i>			(34/310662)
Approve Stock/Cash Award to Executive	M0541	25	
Approve Share Plan Grants	M0593	9	

# Appendix B

## Chapter 2 Appendix

Table B.1: Variable Definitions

Variable	Definition
<b>Variables Related to Funds' Stock Lending and Recall Activities</b>	
<i>On Loan Dummy<sub>i,t</sub></i>	A dummy that equals one if stock <i>i</i> is on loan from fund <i>f</i> in quarter <i>t</i> , and zero otherwise.
<i>Stock On Loan<sub>i,t</sub></i>	A dummy that equals one if stock <i>i</i> is on loan from any active funds in quarter <i>t</i> , and zero otherwise.
<i>No. of Funds Lending<sub>i,t</sub></i>	Number of active funds that lend stock <i>i</i> in quarter <i>t</i> .
<i>Recall Dummy<sub>i,t</sub></i>	A dummy that equals one if stock <i>i</i> is recalled by fund <i>f</i> in quarter <i>t</i> , and zero otherwise. A stock is recalled by fund <i>f</i> in quarter <i>t</i> if it was on loan from fund <i>f</i> in quarter <i>t-1</i> but is not on loan in quarter <i>t</i> .
<i>Recall/On Loan Ratio<sub>i,t</sub></i>	The ratio of the number of active funds that recall stock <i>i</i> in quarter <i>t</i> to the number of active funds that lend stock <i>i</i> in quarter <i>t</i> .
<i>Sell Dummy<sub>i,t</sub></i>	A dummy that equals one if fund <i>f</i> either reduces or liquidates its position in stock <i>i</i> from quarter <i>t-1</i> to quarter <i>t</i> , and zero otherwise.
<i>No. of Stocks Lent<sub>i,t</sub></i>	Number of stocks on loan from fund <i>f</i> in quarter <i>t</i> .
<i>Lending Dummy<sub>i,t</sub></i>	A dummy that equals one if fund <i>f</i> ever lends a stock in 2007, zero otherwise.
<b>Equity Loan Market Variables</b>	
<i>Short Interest<sub>i,t</sub></i>	The total number of shares of stock <i>i</i> that are shorted at the end of month <i>t</i> divided by the total shares outstanding.
<i>Stock Loan Supply<sub>i,t</sub></i>	The total number of lendable shares of stock <i>i</i> divided by the total outstanding shares of stock <i>i</i> in month <i>t</i> . This monthly variable is obtained from the daily average loan supply ratio in the Market database.
<i>Stock Loan Fee<sub>i,t</sub></i>	The average daily indicative fee of stock <i>i</i> in month <i>t</i> , as reported in the Market database.
<i>Sqr. Stock Loan Fee<sub>i,t</sub></i>	Squared stock loan fee in month <i>t</i> .
<b>Stock Characteristics</b>	
<i>Log Size<sub>i,t</sub></i>	Logarithmic value of stock <i>i</i> 's market capitalization at the end of quarter <i>t</i> .
<i>MB Ratio<sub>i,t</sub></i>	Market-to-book ratio of stock <i>i</i> at the end of its fiscal year.
<i>BM<sub>i,t</sub></i>	Book-to-market ratio of stock <i>i</i> at the end of its fiscal year.
<i>Sales Growth<sub>i,t</sub></i>	Net growth of total annual sales of stock <i>i</i> from year <i>t-1</i> to year <i>t</i> .
<i>3-Month Past Return<sub>i,t</sub></i>	Three-month past return of stock <i>i</i> at the end of quarter <i>t</i> .
<i>12-Month Past Return<sub>i,t</sub></i>	Twelve-month past return of stock <i>i</i> at the end of quarter <i>t</i> .
<i>ROI<sub>i,t</sub></i>	Return on assets in year <i>t</i> .
<i>Stock Turnover<sub>i,t</sub></i>	Average monthly stock turnover ratio over the last twelve months.
<i>Amihud Ratio<sub>i,t</sub></i>	Average daily Amihud ratio over the last three months.
<i>No. of Analysts<sub>i,t</sub></i>	Number of analysts tracking stock <i>i</i> at the end of quarter <i>t</i> .
<i>Analyst Dispersion<sub>i,t</sub></i>	Standard deviation of the EPS forecast by financial analysts divided by the mean EPS forecast at the end of quarter <i>t</i> .
<i>Near Vote Record<sub>i,t</sub></i>	A dummy that equals one if stock <i>i</i> 's record date for an annual meeting is within 15 calendar days following the end of quarter <i>t</i> , zero otherwise.
<i>Near Div. Record<sub>i,t</sub></i>	A dummy that equals one if stock <i>i</i> 's record date for a cash dividend is within 15 calendar days following the end of quarter <i>t</i> , zero otherwise.
<i>Portfolio Weight<sub>i,t</sub></i>	Ratio of the total holding in stock <i>i</i> by fund <i>f</i> to the total value of portfolio of fund <i>f</i> at the end of quarter <i>t</i> .
<i>Ownership in Firm<sub>i,t</sub></i>	Ratio of the total holding in stock <i>i</i> by fund <i>f</i> to the total market value of the stock <i>i</i> at the end of quarter <i>t</i> .
<b>Fund Characteristics</b>	
<i>TNAV<sub>i,t</sub></i>	Total Net Assets of mutual fund <i>f</i> at the end of quarter <i>t</i> .
<i>Expense Ratio<sub>i,t</sub></i>	The total expense ratio of mutual fund <i>f</i> in year <i>t</i> .
<i>Port Turnover<sub>i,t</sub></i>	The portfolio turnover ratio of mutual fund <i>f</i> in year <i>t</i> .
<i>Fund Annual Return<sub>i,t</sub></i>	Net expense annual return of mutual fund <i>f</i> in year <i>t</i> .
<i>Fund Age<sub>i,t</sub></i>	Age of the mutual fund since its inception year.
<i>Family TNAV<sub>i,t</sub></i>	Combined Total Net Assets of the actively managed domestic equity funds that belong to the same family as fund <i>f</i> at the end of quarter <i>t</i> .
<i>Active Share<sub>i,t</sub></i>	The sum of the squared difference between fund <i>f</i> 's portfolio weights and its closest index's portfolio weights. This is obtained from website <a href="http://www.ActiveShare.info">www.ActiveShare.info</a> maintained by Martijn Cremers.
<i>Fund FF4 Alpha<sub>i,t</sub></i>	The four-factor adjusted average monthly alpha of fund <i>f</i> in year <i>t</i> . We use the previous 36 months of data to estimate a fund's factor loadings.

Figure B.1: Example of Stock Lending Data

This figure presents an example of data from one of the funds in our sample (Vantagepoint 500 fund). Entries accompanied with a † symbol are currently on loan, and entries accompanied with an \* symbol are non-income producing. The example comes from the September 2007 N-Q filing for Vantagepoint funds.

### SCHEDULE OF INVESTMENTS (Continued)

September 30, 2007 (Unaudited)

Vantagepoint 500  
Stock Index Fund

	Shares	Value
<b>COMMON STOCKS—(Continued)</b>		
<b>Oil &amp; Gas-11.2%</b>		
Anadarko Petroleum Corporation	14,377	\$ 772,764
Apache Corporation	10,292	926,898
Ashland Inc.	1,771	106,632
Baker Hughes, Inc.	9,795	885,174
BJ Services Company	† 8,811	233,932
Chesapeake Energy Corporation	† 13,057	460,390
Chevron Corporation	67,056	6,275,100
ConocoPhillips	51,141	4,488,646
Devon Energy Corporation	13,789	1,147,245
EOG Resources, Inc.	† 7,355	531,987
El Paso Corporation	22,180	376,395
ENSCO International, Inc.	4,797	269,112
Exxon Mobil Corporation	174,163	16,120,527
Halliburton Company	28,258	1,085,107
Hess Corporation	8,659	576,083
Marathon Oil Corporation	21,170	1,207,113
Murphy Oil Corporation	6,012	420,179
Nabors Industries Ltd.	* 8,284	254,899
Nicor, Inc.	† 1,395	59,846
Noble Corporation (Cayman Islands)	8,474	415,650

Table B.2: List of Selected Index Funds

American Century Equity Index Fund
BNY Hamilton S&P 500 Index Fund
Bridgeway Funds, Inc: Blue-Chip 35 Index Fund
DFA Investment Dimensions Group Inc: US Large Cap Value Portfolio
DFA Investment Dimensions Group Inc: US Large Company Portfolio
DFA Investment Dimensions Group Inc: US Small Cap Portfolio
DFA Investment Dimensions Group Inc: US Small Cap Value Portfolio
DFA Investment Dimensions Group Inc: US Targeted Value Portfolio
Dreyfus Basic S&P 500 Stock Index Fund
Evergreen Equity Index Fund; Class I Shares
Fidelity NASDAQ Composite Index Fund
Fidelity Spartan 500 Index Fund
Fidelity Spartan Extended Market Index Fund
Gartmore Mid Cap Market Index Fund
Gartmore S&P 500 Index Fund
Gartmore Small Cap Index Fund
GuideStone Equity Index Fund
Munder S&P MidCap Index Equity Fund
Northern Institutional Funds: Small Company Index Portfolio
Principal Investors Fund, Inc: MidCap S&P 400 Index Fund
Schwab Small-Cap Index Fund; Investor Class Shares
T Rowe Price Equity Index 500 Fund
T Rowe Price Extended Equity Market Index Fund
T Rowe Price Total Equity Market Index Fund
UBS S&P 500 Index Fund
Vanguard 500 Index Fund
Vanguard Extended Market Index Fund
Vanguard Growth Index Fund
Vanguard Large-Cap Index Fund
Vanguard Mid-Cap Index Fund
Vanguard Small-Cap Index Fund
Vanguard Value Index Fund
Vantagepoint Funds: 500 Stock Index Fund
Vantagepoint Funds: Broad Market Index Fund
Vantagepoint Funds: Mid/Small Company Index Fund

Table B.3: Stock Lending Determinants: Logistic Regression Results

This table reports the Logistic regression results regarding an equity fund's stock lending decision. The sample used in Columns (1)-(4) includes all stocks held by the active funds that participate in stock lending during 2006Q3-2007Q4, whereas the sample used in Columns (6)-(9) includes all stocks held by the selected index funds that participate in stock lending in the same period. Columns (5) and (10) include only the stocks that are held by both the active and index funds. The dependent variable *On Loan Dummy* equals one if fund *f* lends stock *i* at the end of quarter *t*, zero otherwise. Please refer to Appendix A for the other variable definitions. All variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. T-statistics, reported in parentheses, are based on standard errors clustered at the fund level. \*\*\*, \*\*, \* indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	Dep. Variable = On Loan Dummy <sub>it</sub>									
	Active Funds					Selected Index Funds				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log Size <sub>it-1</sub>	-0.3860*** (-10.48)	-0.4338*** (-11.66)	-0.4287*** (-11.35)	-0.2741*** (-7.11)	-0.2776*** (-7.12)	-0.2782** (-2.37)	-0.2966** (-2.08)	-0.2911** (-2.04)	-0.1366 (-0.96)	-0.1556 (-1.09)
MB Ratio <sub>it-1</sub>	0.0368*** (7.20)	0.0361*** (7.08)	0.0358*** (6.83)	0.0223*** (4.24)	0.0226*** (4.29)	0.0342*** (5.68)	0.0338*** (5.08)	0.0306*** (4.24)	0.0149** (2.56)	0.0144** (2.26)
Sales Growth <sub>it-1</sub>	0.5292*** (7.46)	0.4798*** (6.75)	0.5246*** (7.14)	0.4258*** (5.61)	0.4272*** (5.56)	0.1197 (1.17)	0.0954 (0.91)	0.0304 (0.27)	-0.0685 (-0.71)	-0.0745 (-0.74)
3-Month Past Ret. <sub>it-1</sub>	0.0506 (0.43)	0.0850 (0.74)	0.0594 (0.51)	-0.0523 (-0.42)	-0.0568 (-0.46)	0.3137** (2.06)	0.3325** (2.09)	0.3021* (1.67)	0.2624 (1.41)	0.2872 (1.52)
12-Month Past Ret. <sub>it-1</sub>	-0.0630 (-0.91)	-0.0799 (-1.16)	-0.0321 (-0.45)	0.0786 (1.10)	0.0792 (1.09)	-0.3177*** (-4.37)	-0.3423*** (-4.69)	-0.3116*** (-4.55)	-0.2046*** (-2.89)	-0.2280*** (-3.08)
ROA <sub>it-1</sub>	-0.3157** (-2.10)	-0.3162** (-2.13)	-0.3185** (-2.07)	0.0079 (0.05)	0.0076 (0.05)	-0.6856*** (-4.57)	-0.6822*** (-4.24)	-0.5307*** (-2.82)	-0.4101*** (-2.63)	-0.4073*** (-2.73)
Stock Turnover <sub>it-1</sub>	0.1663*** (12.00)	0.1677*** (12.11)	0.1595*** (11.17)	-0.0367** (-2.30)	-0.0379** (-2.38)	0.2402*** (9.33)	0.2599*** (10.88)	0.2491*** (10.64)	0.0350 (1.46)	0.0377* (1.83)
Amihud Ratio <sub>it-1</sub>	-8.8629*** (-4.66)	-9.2220*** (-4.64)	-10.5105*** (-5.22)	-4.1753*** (-3.41)	-5.2201*** (-3.13)	-5.2709*** (-2.73)	-5.2492*** (-2.80)	-6.6357*** (-3.37)	-2.4354*** (-2.60)	-4.2956*** (-3.51)
Return Volatility <sub>it-1</sub>	-0.2603 (-0.46)	-0.2734 (-0.48)	-0.6630 (-1.12)	0.5246 (0.84)	0.5899 (0.94)	-1.6860** (-1.99)	-2.1356*** (-2.82)	-2.6099*** (-3.82)	-0.9666 (-1.45)	-1.0941 (-1.64)
No. of Analysts <sub>it-1</sub>	-0.0047 (-1.34)	-0.0047 (-1.36)	-0.0020 (-0.56)	0.0045 (1.18)	0.0049 (1.29)	-0.0188*** (-3.65)	-0.0208*** (-4.30)	-0.0193*** (-4.14)	-0.0113* (-1.90)	-0.0109* (-1.80)
Analyst Dispersion <sub>it-1</sub>	0.5144*** (5.40)	0.5263*** (5.58)	0.5026*** (4.59)	0.1122 (1.07)	0.0985 (0.93)	0.2242*** (3.57)	0.2289*** (3.36)	0.1684*** (2.68)	0.0188 (0.24)	0.0243 (0.31)
Near Div. Record <sub>it</sub>	-0.2674*** (-2.74)	-0.2471** (-2.53)	-0.2411** (-2.46)	-0.2652*** (-2.58)	-0.2713*** (-2.64)	-0.3614 (-1.02)	-0.3795 (-1.14)	-0.3764 (-1.14)	-0.4143 (-1.22)	-0.4203 (-1.23)
Near Vote Record <sub>it</sub>	-0.5797*** (-4.54)	-0.5695*** (-4.53)	-0.5083*** (-4.14)	-0.5020*** (-4.01)	-0.5019*** (-4.01)	-0.4165 (-1.24)	-0.4715 (-1.43)	-0.5419* (-1.68)	-0.5565* (-1.68)	-0.5507 (-1.59)
Portfolio Weight <sub>it-1</sub>		25.0725*** (6.38)	25.9985*** (6.57)	25.7319*** (6.47)	25.9878*** (6.39)		13.0913 (0.16)	11.2396 (0.14)	0.0528 (0.00)	4.0030 (0.05)
Ownership in Firm <sub>it-1</sub>		-8.6436 (-1.59)	-8.4296 (-1.47)	-9.3103 (-1.55)	-9.1370 (-1.50)		-319.1214** (-2.34)	-330.7983** (-2.35)	-340.1129** (-2.33)	-366.2698** (-2.57)
Stock Loan Fee <sub>it-1</sub>			26.4272*** (11.81)	33.7173*** (3.79)	33.6208*** (3.73)			13.1252*** (4.41)	5.1592 (0.60)	0.1295 (0.02)
Sq. Stock Loan Fee <sub>it-1</sub>				-388.6564*** (-3.31)	-389.0190*** (-3.24)				-43.6123 (-0.80)	4.6194 (0.07)
Short Interest <sub>it</sub>				12.3907*** (22.32)	12.3527*** (22.19)				11.9536*** (8.13)	11.8807*** (8.13)
Stock Loan Supply <sub>it</sub>				-1.8439*** (-6.21)	-1.8355*** (-6.14)				-2.1080*** (-2.69)	-2.2488*** (-2.91)
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	122,422	122,422	109,980	109,980	108,627	106,308	106,308	95,051	95,051	93,501
Pseudo R-squared	0.09	0.09	0.10	0.13	0.13	0.08	0.11	0.11	0.15	0.15

Table B.4: Stock Loan Market Conditions and Funds' Selling Decisions: Logistic Regression Results

This table examines whether active funds' selling activities respond to the information in the stock loan market using a Logistic model. The dependent variable *Sell Dummy* equals one if fund *f* reduces or liquidates its position in stock *i* at the end of quarter *t*, zero otherwise. Columns (1)-(3) examine the active funds' selling decisions. Columns (4)-(6) examine the selected index funds' selling decisions. Please refer to Appendix A for the other variable definitions. All variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. T-statistics, reported in parentheses, are based on standard errors clustered at the fund level. \*\*\*, \*\*, \* indicate significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	Dep. Variable = Sell Dummy <sub><i>f,i,t</i></sub>					
	Active Funds			Selected Index Funds		
	(1)	(2)	(3)	(4)	(5)	(6)
Recall Dummy <sub><i>f,i,t</i></sub>	0.7863*** (10.34)	0.7742*** (10.20)	0.7575*** (10.06)	0.9551*** (4.45)	0.9434*** (5.43)	0.9332*** (4.66)
Log Size <sub><i>i,t-1</i></sub>	-0.1568*** (-7.45)	-0.1483*** (-6.84)	-0.1517*** (-6.92)	-0.2401** (-2.01)	-0.2428** (-2.03)	-0.2427* (-1.94)
BM <sub><i>i,t-1</i></sub>	-0.4018*** (-4.67)	-0.3869*** (-4.65)	-0.4083*** (-4.86)	-0.0256 (-0.11)	-0.0133 (-0.06)	-0.0345 (-0.15)
12-Month Past Return <sub><i>i,t-1</i></sub>	0.0210 (0.43)	0.0234 (0.48)	0.0126 (0.26)	0.1989 (1.41)	0.2060 (1.53)	0.2061 (1.47)
Short Interest <sub><i>i,t-1</i></sub>		0.5690* (1.90)	0.5367 (1.63)		0.2757 (0.16)	0.1325 (0.07)
Stock Loan Fee <sub><i>i,t-1</i></sub>			-0.5496 (-0.45)			1.6513 (0.47)
Change in Stock Loan Fee <sub><i>i,t</i></sub>			7.1164*** (2.97)			-0.6657 (-0.25)
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	145,377	145,176	130,097	58,157	58,067	51,306
Pseudo R-squared	0.02	0.02	0.03	0.09	0.09	0.09

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