Essays in Hedge Fund Activism Networks and Corporate Governance:

Author: Pouyan Foroughi

Persistent link: http://hdl.handle.net/2345/bc-ir:107614

This work is posted on eScholarship@BC,
Boston College University Libraries.

Boston College Electronic Thesis or Dissertation, 2017

Copyright is held by the author, with all rights reserved, unless otherwise noted.

Boston College

Wallace E. Carroll Graduate School of Management

Department of Finance

ESSAYS IN HEDGE FUND ACTIVISM NETWORKS AND CORPORATE GOVERNANCE

a dissertation

by

POUYAN FOROUGHI

Submitted in partial fulfillment of the requirements for the degree of

Doctor of Philosophy in Finance

August 2017

© Copyright by POUYAN FOROUGHI
2017

ACKNOWLEDGEMENTS

I would like to thank to my PhD advisors, Ronnie Sadka and my committee members, Edith Hotchkiss, Nadya Malenko, and Hassan Tehranian for supporting me during these past five years. You have been tremendous mentors for me. I would like to thank you for encouraging my research and for allowing me to grow as a research scientist. Your advice on both research as well as on my career have been invaluable.

A special thanks to my wife, Nazanin. Words can not express how grateful I am to you for all of the sacrifices that you made on my behalf. I can't thank you enough for encouraging me throughout this experience. Finally, I thank my parents, parents-in-law for their love, and support for me over the years. I could never get to this point without any of you.

I dedicate this thesis to
my wife, Nazanin for her constant
support and unconditional love.

ESSAYS IN HEDGE FUND ACTIVISM NETWORKS AND CORPORATE GOVERNANCE

POUYAN FOROUGHI

ADVISOR:

Ronnie Sadka

COMMITTEE:

Edith Hotchkiss, Nadya Malenko, Hassan Tehranian

ABSTRACT:

In the first essay, In this paper, I examine how the connections between activist hedge funds and other institutional investors affect the activist campaigns. I identify a positive causal effect of long-term relationships with other investors on the short-run and long-run performance of activists' target companies. Overall, my results highlight that connections to other institutional investors benefit institutional asset managers.

In the second essay, we show that firms in the same board-interlock networks tend to have similar corporate governance practices. We utilize a novel instrument based on staggered adoptions of universal demand laws across states to identify causal peer effects in firms' decisions to adopt various governance provisions. The impact of universal demand laws on the incentives faced by directors as they seek to maximize their career outcomes is a likely mechanism explaining these effects.

In the third essay, I investigate whether hedge funds employ short sales to *mask* their exiting intention when they engage in shareholder activism. Using a hand-collected sample, I find that the probability of a spike in short interest before exit announcements is higher in firms targeted by activists who have a history of short interest increase in their previous targets. According to my findings, the hypothesis is that these hedge funds are more likely to use short sales since they are more concerned about locking their profit and not taking the risk of exit announcements. Overall, this paper provides new evidence of a possible exiting strategy: *Silent Exiting* via short selling.

ESSAYS IN HEDGE FUND ACTIVISM NETWORKS AND CORPORATE GOVERNANCE

POUYAN FOROUGHI

TABLE OF CONTENTS

First Chapter: Hedge Fund Activists' Network and Information Flows

1 Introduction

Shareholder activists, which have become a dominant force in corporate governance, take positions in underperforming companies and push management for strategic, financial, and governance changes. One development that has affected the nature of activist campaigns and empowered activists has been the development of strong ties to managers at other investment firms including those at large mutual funds such as T. Rowe Price, Fidelity Investments, and Wellington Management. [1] The goal of this paper is to examine whether connections with such investors affects the performance and characteristics of activist campaigns. My main finding is that activist's connectedness with other institutional investors has a strong positive effect on both the market reaction to its engagements announcements and the long-run performance of its targets. I identify this effect using turnovers of mutual fund managers as exogenous shocks to activists' connectivity. I also explore the channels through which connections between activists and other investors affect the activists' performance.

There are at least two reasons to expect that activists with more connections to other investors run more successful campaigns, both of which are related to information flows between activists and other investors. The first, which I refer to as the "information-gathering channel", is that well-connected activists may receive information from other investors before selecting a target, allowing them to target firms that have more potential for improvement. Indeed, communicating with other investors prior to campaigns is a regular part of activists' strategy, which enables them to garner other investors' opinions about potential targets. [2] Disappointed institutional shareholders could

[1] See "Despite Turbulence, Shareholder Activism Is Forecast to Stay Strong," The New York Times, March 18, 2016.

[2] "I'm happy to give people my thoughts on things I own and I'm happy to learn about how other people think ...Putting earplugs in and blinders on isn't the smart approach," Greg Taxin, head of the activist strategy of hedge-fund

be another important source of information for activists. Activist investors can benefit from their relationships with this group of investors and be invited to run campaigns against the management of the firms they hold in their portfolio. [3]

The second reason why connected activists may run better campaigns, which I refer to as the "support channel", is that connections can help distribute information about the campaign among investors, which can bring investors' attention to targeted firms and help an activist obtain more shareholder support for the campaign and be more influential in its negotiations with management. Activist investors themselves on average acquire only between 6% and 7% of their targets' outstanding shares (Brav et al., 2010), which means that support from other shareholders is necessary for a successful campaign. ValueAct's successful campaign targeting Microsoft, despite the fact that ValueAct owned only 1% of Microsoft shares, provides an example of the importance of the relationship between the activist and other investors.[4] My findings provide evidence for both the information-gathering channel, whereby well-connected activists receive more information useful in selecting a target, and the support channel, whereby well-connected activists distribute information about their campaigns across the investor network, allowing them to gain higher shareholder support.

The first step in examining whether connections positively affect activist engagements is to construct measures that proxy for activists' connectedness. To construct these measures, I build a network of investors based on their past investment behavior in activists' targets and then employ centrality measures from Social Network Analysis (SNA) to create proxies for the position of an activist in the investors' informational network. Specifically, I use institutional holdings and 13D and 13G schedule filings data to identify institutional shareholders that significantly[5] increase their positions in a given activist's targets around activism announcements. I define two investors (an

firm Clinton Group Inc. See "Activist Investors Leak their Plans to a Favored Few," The Wall Street Journal, March 27, 2014. This article also mentions private conversations between Elliott Management Corp. and Jana Partners LLC before public announcements of an activist engagement.

[3]See "New Alliances in Battle for Corporate Control," The New York Times, March 18, 2014.

[4]See "Activists' Secret Ally: Big Mutual Funds — Large investors quietly back campaigns to force change at U.S. companies," The Wall Street Journal, August 10, 2015.

[5]By at least 1 percentage point in the main tests and by at least 2 percentage points in robustness tests.

activist and a non-activist investor, or two non-activist investors) that significantly increase their ownership in the same target at a similar point in time as being connected over the subsequent five years (three years in robustness tests).

The motivation for using institutions' past investment patterns in activists' targets is twofold. First, activists usually start communicating with other shareholders after announcing their campaign, making them informationally connected. Second, the literature finds that blockholders that hold the same securities in their portfolios are likely to be in the same information network (Pareek, 2012; Ozsoylev et al., 2014) and tend to cooperate with each other to make positive changes in companies where they own large stakes (Crane et al., 2016). After building the network of investors in this way, I introduce centrality measures, as used in SNA, which capture the importance of each investor in the network relative to other investors; these measures are used by many existing studies on social networks in financial markets. The first centrality measure, Degree, captures the number of connections between an investor and other investors in the network. The other centrality measure, Eigenvector, accounts for the quality of connections: it is a variation of Degree centrality in which connections are weighted by their relative importance in the network.

In the next step, I relate these measures to the performance of hedge fund activist engagements. The main variable that I use as a proxy for engagement performance is the abnormal return around engagement announcements, which is widely used in the hedge fund activism literature.[6] Controlling for various target and activist characteristics, as well as activist, year, and industry fixed effects, I find that better-networked hedge fund activists experience a larger abnormal return in their targets around engagement announcements. The economic magnitude of these effects is meaningful: a one standard deviation increase in Degree centrality of the activist increases the abnormal return during the (-20, +20) announcement window by about 3 percentage points (from the 6 percentage point sample average), and a one standard deviation increase in Eigenvector centrality increases the

[6]Later, I also use the success rate, the long-term return, and industry adjusted operating performance as alternative measures of engagement performance.

return by around 2.6 percentage points.

These results provide suggestive evidence that connections with institutional investors benefit hedge fund activists. Of course, an alternative explanation for these results is that omitted activist characteristics are related both to the activist's network position and to its performance. For example, prior literature shows that engagements of well-reputed and experienced hedge fund activists are associated with larger positive reactions from the market (e.g. Zur, 2009; Krishnan et al., 2015; Boyson et al., 2016). Because well-reputed activists are also more likely to be followed by investors and hence be more central, the positive correlation between activist centrality and announcement returns could be explained by activist reputation or skill. Since these qualities develop over time, controlling for activist fixed-effects does not address this issue.

I therefore employ a novel identification strategy based on exogenous shocks to connections between hedge fund activists and a subset of institutional investors (mutual funds, specifically), using turnovers of actively managed mutual fund managers. Managers' social ties have been shown to be an important part of the decision making process both in mutual funds (Hong et al., 2005; Cohen et al., 2008) and in hedge funds (Gerritzen et al., 2016), and hence I expect turnovers of mutual fund managers to affect the links between activists and mutual funds. To verify this hypothesis, I provide two pieces of evidence. First, I show that the probability of an activist targeting a firm decreases when it loses its connections with significant shareholders of that firm. Second, I show that mutual funds that have lost their prior connections with activist investors are less likely to increase their ownership in the activists' targets. These results confirm the hypothesis that mutual fund manager turnovers disconnect hedge fund activists from mutual funds, allowing me to use them as shocks to the level of connectivity of hedge fund activists. At the same time, these shocks are likely to be exogenous in that turnovers of managers are not influenced by mutual funds' connections to activists: for example, on average, activists' targets constitute less than 1% of mutual fund portfolios.[7]

[7] As explained below, to alleviate additional identification concerns about using fund manager turnovers as exogenous shocks, I conduct a placebo test using a pseudo activism sample.

Constructing a measure showing how much of the activist's network centrality is lost due to mutual fund manager turnovers, I test whether losing connections with mutual fund managers affects activists' performance and the market reaction to their engagements. Controlling for fund, year, and industry fixed effects, I find that a one standard deviation decrease in the percentage of connections is associated with a 2.5 percentage point decrease in the abnormal return during the (-20, +20) announcement window, and a larger portion of this effect happens in the pre-announcement period. I next use the success of activist campaigns, the long-term abnormal returns, and industry-adjusted operating performance of the targets as alternative measures of engagement performance and find consistent positive results across each of these measures. Thus, my results indicate that having more connections with other institutions has a significantly positive impact on both the short-term and long-term performance of activists' targets.

As discussed above, having access to more information prior to choosing the target (information gathering channel) and receiving support from other investors after choosing the target (support channel) are the two main channels that could explain why connections improve activists' performance. However, distinguishing between these channels is an empirical challenge. To examine the channels behind the results, I perform two sets of tests. First, I find that an activist connected with an institutional investor that had significant ownership in a firm during the last three years but who has already exited the firm (which I refer to as a "past" investor) is more likely to target that firm. I also find that having connections with past investors of a target increases the campaign's success rate. Because past investors are no longer shareholders of the target during the campaign, these two results cannot be explained by the support channel and thus provide evidence for the information gathering channel: information flows between activists and connected institutions allow activists to choose targets with more potential for improvement. In the second set of tests, I provide evidence for the support channel. I show that mutual funds are less likely to invest in an activist's target if they have lost their connections with that activist and that fewer mutual funds increase

their ownership of targets of an activist that has lost its connections with part of the mutual fund community. Consistent with the support channel, I also find that well-connected activists run more hostile campaigns.

I show that my results are inconsistent with other potential explanations and are robust to alternative definitions of networks and centrality. Using a hand-collected sample of passive investments by hedge fund activists, I show that the effect of centrality on the market reaction to the activist's filing is significantly weaker for passive investments than for activist campaigns by the same activist: I do not find that losing connections with mutual fund managers has any significant effect in passive investments. This finding rejects the argument that my results can be explained by the market reaction to hedge funds' trading skills. I also estimate the same effect in a pseudo activism sample[8] and reject the hypothesis that the effect of mutual fund manager turnovers simply captures the correlation between the quality of substituted mutual fund managers and the quality of the connected activist. In alternative specifications, I weight connections based on the number of past co-ownerships and percentage of ownership and find that all results are robust to these alternative measures.

This paper is related to three strands of literature. First, my paper contributes to the literature showing effects of shareholder activism on short-term and long-term performance of target companies.[9] This literature also examines the role of coordination among institutional shareholders (Artiga González and Calluzzo, 2016; Brav et al., 2016; Doidge et al., 2015; Crane et al., 2016) or the firms' response to such coordination (Boyson and Pichler, 2016).

Appel et al. (2016) show that the presence of passively managed mutual funds is associated with increased use of hostile tactics and a higher likelihood of success by activists. My paper shows that whether activists benefit from behavior of other investors in a target is dependent on their prior

[8] I define a pseudo activist engagement as a significant increase in the ownership by a non-activist long-short equity hedge fund randomly selected from the TASS database. See Section 6.3 for more details.

[9] E.g., see Gillan and Starks (2000),Gillan and Starks (2007), Brav et al. (2008), Clifford (2008), Greenwood and Schor (2009), Klein and Zur (2009), Zur (2009), Brav et al. (2010), Bebchuk et al. (2015), Krishnan et al. (2015), and Foroughi et al. (2016).

connections to these investors, and shows that information flows (in particular, from actively managed mutual funds to the activist) explain the outcomes of activist campaigns. In independent work, He and Li (2016) consider connections of activists to mutual funds, but based on social ties rather than past engagements. Their main focus is on the impact on the mutual fund investors' investment decisions and performance. Using connections based on prior investment behavior further allows me to use mutual fund manager turnovers to identify the causal effect of connections and isolate it from the effects of skill and reputation. Finally, different from all the papers described above, which focus on the support channel, my paper also highlights the information gathering channel, whereby coordination and connections with other investors allow the activist to pick targets with greater potential for improvement.[10]

Outside the setting of hedge fund activism, connections between investors have been used more broadly to explain the importance of information flows, and theoretical and empirical papers show the effect of social networks on investors' decisions (Ozsoylev and Walden, 2011; Walden, 2014; Ozsoylev et al., 2014; Shiller and Pound, 1989; Cohen et al., 2008; Hong et al., 2005; Kelly and Gráda, 2000; Grinblatt and Keloharju, 2001). My paper is also related to a large literature that uses measures from SNA to explain firm or investor performance (for example, for venture capitalists (Hochberg et al., 2007), investment banks (Bajo et al., 2016), boards of directors (Larcker et al., 2013), and CEOs (El-Khatib et al., 2015)). Using exogenous shocks that break the connections between hedge fund activists and mutual funds, my paper suggests a novel approach for identifying the effect of connectivity in the investor network.

The remainder of the paper is organized as follows. Section 2 describes the sample and presents descriptive statistics. In Section 3, I define centrality measures and analyze the relation between activists' connectivity and performance. Section 4 introduces the empirical design, and Section 5 explains the identification strategy and establishes the causal effects of connectivity on activists'

[10]Gantchev and Jotikasthira (2017) also emphasize the role of institutions in hedge fund activism, but differently from my paper, they focus on the liquidity channel.

short-run and long-run performance. Section 6 presents the robustness tests, and Section 7 concludes.

2 Data and Descriptive Statistics

This section describes the data collection process and presents descriptive statistics of the sample.

2.1. *Activism Sample*

The SEC requires any investor that acquires beneficial ownership of more than 5% of any class of publicly traded securities in a public company and is not a passive investor to file a Schedule 13D and reveal information about the size and goals of its acquisition. I consider 13D filings by hedge fund activists from 1994 to 2007 (I stop in 2007 so as not to include observations affected by the financial crisis).[11]

In the main tests, following studies that employ centrality measures from SNA, I use a five-year window to calculate centrality measures for each activist at the time of the announcement. Therefore, the sample of activist engagements studied in the paper includes events between 1999 and 2007, while the 1994-2007 sample of engagements is used to construct centrality measures.

2.2. *Passive Investments Sample*

The SEC also requires any investor that acquires beneficial ownership of more than 5% of any class of publicly traded securities in a public company and is a passive investor to file a Schedule 13G and reveal information about the size of its acquisition. Using a web crawler program to read through 13G filings, I collect 13G filings filed by the same hedge fund activists as those in my activism sample.[12]

[11] My sample is an extended version of the sample used in Brav et al. (2008). I thank Alon Brav for providing me with these data.

[12] Generally, regulations of the required initial filing of 13G are different for three groups of investors: the first group ("passive" investors) are required to file within ten days after they pass the 5% threshold, while two other groups

2.3. *Ownership Data*

As explained in the introduction and in Section 3 below, I use investment behavior of institutional investors in activists' targets around engagement announcements to construct the network of connected investors. To identify changes in investors' ownership in target firms, I first collect ownership data from the Thomson-Reuters 13F database. I then complete this sample by adding information in related 13D and 13D amendment filings filed by institutional investors around engagement announcements, using a web crawler and a text-analysis program.[13]

2.4. *Mutual Fund Manager Turnovers*

As explained in more detail in Section 4, I use mutual fund manager turnovers as exogenous shocks to activists' connectivity. The data on manager turnovers come from Morningstar and CRSP. Since only actively managed mutual funds can increase their ownership in activists' targets due to their connections to activists, I exclude index funds from the sample. Following Kostovetsky and Warner (2015), I eliminate these funds by looking for the words "index", "S&P", "Dow Jones", and "NASDAQ" in the fund name and exclude all funds in the Dimensional Fund Advisors, Direxion, Potomac, ProFund, and Ryder fund families.

I use the Thomson-Reuter Mutual Fund Holding database to track significant changes in mutual fund ownership around engagement announcements at the individual fund level. Because my measure of network connections is based on ownership at the fund family level from the Thomson-Reuter 13F database, I manually match the Mutual Fund Holding database to the Thomson-Reuter 13F database in order to understand which connections of the fund family were lost due to a spe-

("qualified" and "exempt" investors) are not required to file for a longer period, up to 45 days after the end of the next financial year. To identify ownership changes more precisely, I only keep the filings for the first group of "passive" investors. Since hedge fund activists are rarely considered as "qualified" and never as "exempt," this eliminates less than 3% of filings by activists.

[13] One of the challenges in building a network is to group investors in a proper way. Many individual shareholders always file Schedule 13Ds and 13D amendments with a certain institutional investor. I group these investors with those institutions.

cific fund manager turnover.[14] In the remainder of the paper, for simplicity, I refer to mutual fund families as simply to funds. In robustness tests, I also used LinkedIn, Morningstar, Bloomberg, news articles, and SEC filings by mutual funds to filter out turnovers in which managers kept their job as a portfolio manager in the same fund or another fund (please see Section 6.6 for details).

2.5. *Control Variables*

Control variables for firm characteristics are derived from CRSP and Compustat. These variables include Market Value, Growth rate, Cash Flow ratio, Leverage ratio, Cash ratio, R&D, Long-term Debt ratio, Tobin's Q, Book Value of Equity to Market Value of Equity, and the Amihud illiquidity measure. Table A1 provides details on the construction of these variables. I obtain information about activists' size from the Lipper/TASS dataset. As the overlap between my sample and TASS is about 50%, I do not control for activists' assets under management in the main tests and only control for them in a robustness test (see Table A10).

2.6. *Descriptive Statistics*

The activism sample covers 1,449 activist engagements between 1999 and 2007. Depending on the availability of other variables, the sample size in various regressions and in Table 1 can be smaller. Panel A of Table 1 shows the summary statistics of firms targeted by activists. The average market value and book to market ratio of a target in my sample are around $620 million and 0.91, respectively. Panel B represents activist funds' characteristics at the time of an engagement announcement. It shows that on average an activist in my sample has launched about 18 engagements before the current announcement and has $4.4 billion in assets under management, which means that activist campaigns are run by experienced and large hedge funds. Finally, the summary statistics of outcome variables in my sample are presented in Panel C. The average abnormal return around engagement announcements is 6%, and the activist is successful in achieving its goals in 31% of engagements.

[14] I do it by comparing ownership at the family level and the fund level and verifying that the increase in ownership at the family level is due to the increase in ownership of a specific fund in the family that experienced manager turnover.

The definitions of all variables are provided in Table A1.

3 Centrality Measures and Baseline Results

Positive implications of social connections have been shown by many theoretical and empirical papers. For example, portfolio decisions are related to managers' connectivity and the information they receive from close agents in their network (Kelly and Gráda, 2000; Grinblatt and Keloharju, 2001; Cohen et al., 2008). On the other hand, network connectedness could also have negative implications if social communication crowds out information production (Han and Yang, 2013) or if agents receive signals that are positively correlated with their signals (Colla and Mele, 2010). Thus, it is not perfectly clear whether connections would play a positive or negative role in shareholder activism. The goal of my paper is to answer this question by building centrality measures of shareholder activists in the institutional investor network.

In this section, I explain the construction of centrality measures and provide preliminary results on the association between network centrality and the abnormal return around activism announcements.

3.1. *Measures Characterizing Hedge Fund Activists' Network*

To study the effect of the activists' network position, it is necessary to construct the variables that capture and quantify it. Social Network Analysis (SNA) provides a set-up that allows me to measure activists' centrality using their connections (based on co-ownership in targets) with other institutional investors.

Similar to other studies that investigate the effect of connectivity on agents' performance, I go through three steps to construct centrality measures. The first step is to define a connection between two investors. Figure 1 presents the graphical illustration of this definition. At a given point in time t, I define two investors as connected if they have co-invested in at least one activist's campaign over

the last five years, i.e., in the (t-5, t) period. More specifically, for any activist's campaign that took place over the last five years (e.g., the campaign of activist hedge fund 3 in Figure 1), I consider all investors that have increased their ownership in the activist's target by at least 1 percentage point over the six-month period around the announcement of the campaign (e.g., fund 1 and fund 2 in Figure 1).[15]

I then define such investors as being connected to the activist as well as connected to each other. For example, Figure 1 implies that activist fund 3 is connected to both fund 1 and fund 2, and that funds 1 and 2 are connected to each other. I then aggregate such links across all activist campaigns over the (t-5, t) period, which gives me the network of connections as of time t. I focus on the 5-year period following Hochberg et al. (2007); Bajo et al. (2016), and consider a 3-year period in robustness tests in Table A8. In the next two steps, I build centrality measures based on this dynamically changing network. Figure 3 shows the evolution of the investor network over time.

After storing all of the links between institutional shareholders, I build an adjacency matrix (this matrix is also dynamic and constructed at the time of each campaign announcement). Each cell of the matrix takes a value of one ($x_{ij} = 1$) if there is a connection between the two institutional investors (Fund i and Fund j) and a value of zero otherwise. In my analysis, I do not consider the direction of connections between two institutional shareholders, so this matrix is symmetric, and the centrality measures are calculated based on undirected networks. Several measures have been associated with the position of a financial agent in a network. I use the two most frequently used centrality measures in the finance and economics literature: *Degree and Eigenvector*.

Degree Centrality

Degree is the simplest measure among other centrality measures that capture the number and

[15]In robustness tests, I define a significant increase in ownership as an increase of at least 2 percentage points and show similar results (see Table A9). In addition, in robustness tests, I define the network based on increases in ownership that occurred in the three-month period before the announcement, i.e., excluding increases in ownership that occurred after the announcement (Please see Section 6.3 for more details).

the quality of connections that each agent has with other players in a network. In the context of financial investments, an institutional investor is well-connected if it has more connections to other shareholders. Therefore, if x_{ij} indicates the link between Fund i and Fund j from the matrix introduced above, I define degree centrality as

$$Degree_i = \frac{1}{N-1}\left(\sum_{j \in N_i} x_{ij}\right) \tag{1}$$

where N_i is the set of all investors except for investor i and $\sum_{j \in N_i} x_{ij}$ measures the total number of connections between investor i and other investors. Because I compare the network positions of an activist at different times and the network size is dynamic, I normalize this measure by the network size minus one. Thus, the degree centrality measure in the above formula captures the percentage of the network to which each activist fund is connected.

Eigenvector Centrality

Having direct connections with other agents in a network is more important when these connections are influential. I use the popular form of Eigenvector centrality measure introduced in Bonacich (1972). It incorporates the importance of each relationship in the final value of connectedness. As shown in the following equation, Eigenvector centrality values an agent as well-connected in the network when it has connections with well-connected institutions in the network.

$$Eigenvector_{it} = \lambda \sum_{j \in N_i} x_{ij} Eigenvector_{jt}\,, \tag{2}$$

where λ shows the coefficient (equal to the largest Eigenvalue) that makes the equations system solvable and $Eigenvector_{it}$ denotes the total number of connections between investor i and other investors weighted by other investors' Eigenvector values at time t. In the context of activism investments, a high Eigenvector score means that a fund is connected to central funds in a network and may be able to extract or circulate information more efficiently.

3.2. *Summary Statistics of Centrality Measures*

Panel A of Table 2 shows that, on average, a hedge fund activist in my sample is connected to 9% of investors in the activism network. However, the average Eigenvector is 3%, which means that an activist in my sample is only connected to 3% of the network if I use connections weighted by the importance of investors. Similar to other papers that study social networks in finance, the distribution of centrality measures is skewed to the right. The median activist's Degree centrality is 4%, and a one standard deviation increase in the Degree centrality moves an activist from the first percentile of the sample to the top quartile of the sample. The same pattern is seen for the Eigenvector centrality. In Panel B, I compare characteristics of firms targeted by central activists and characteristics of those targeted by peripheral activists. Numbers in panel B are in line with the hypothesis that central and peripheral activists target different types of firms. As shown in this table, central activists in my sample choose larger and more liquid firms as their targets.

There are several ways to weigh the connections among shareholders. In the main regressions, I use simple weighted centrality measures as defined above. To check the robustness of my results, I repeat all the tests with centrality measures weighted by the number of connections between investors and by the increase in the percentage of ownership around the engagements. These results are consistent with the main results and are presented in Tables A2 and A7 in the Appendix. In the following section, I normalize centrality measures by their mean and standard deviation to make the interpretation of presented results simpler.

3.3.*Baseline Results: Activist's Centrality and Announcement Return*

To test the relation between the network position and activism performance, I estimate the following regression:

$$CAR_{ijt} = \beta_1 Centrality\ Measure_{it} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt} \tag{3}$$

where *Centrality Measure* is a normalized variable that captures the position of activist i in the

investor network before the announcement of targeting firm j in year t. θ_i, γ_t and λ_{Ind_j} capture the activist fund-fixed effect, year fixed-effect, and industry fixed-effect, respectively. Dependent variables in this regression are abnormal returns around engagement announcements (CAR (-20, +20) and CAR (-10, +10). Z_t stands for a vector of target characteristics, activist characteristics, and campaign characteristics. Target-specific variables are calculated based on the target firm's financial information in the year before the announcement and are the same as the ones explained in Section 3. Activist and campaign characteristics are calculated at the time of the announcement.

Another variable that might explain the activist's performance is the experience of the lead activist. Boyson et al. (2016) document that experienced activists receive a better reaction from the market around announcements compared to newcomers. I control for the activist's experience by including the number of prior engagements as a control variable. Finally, I control for the purpose of activist engagements, revealed in item 4 of Schedule 13D, in all tests of this section.

Results in Table 3 show that a one standard deviation in centrality is associated with a 3% increase in the abnormal return in the twenty-day window around an announcement (CAR (-20, +20)) and a 2.5% increase in the abnormal return in the ten-day window around an announcement (CAR (-10, +10)). In unreported tests, I show that results stay both economically and statistically significant if activist fixed-effects are not included in the regressions.

The size of an activist might be related to both the performance of an engagement and its network position. For example, Krishnan et al. (2015) show that the average size of previous investments explains the abnormal return around the announcements. However, as explained in the data section, I do not have the activist's size for all observations in my sample, so I only control for size in the robustness tests. The results of these regressions are presented in Table A10 in the Appendix and show a similar association between centrality measures and the announcement return.

4 Empirical Design

The goal of this paper is to establish a causal effect of activist funds' connectedness on their performance. While the results in Section 3.3 show a strong positive association between an activist's centrality and the market reaction to the announcement of its campaign, this association is not necessarily causal because centrality in the network is not exogenous and can be associated with other activist's characteristics such as skill, reputation, or media coverage. For example, more reputable activists or activists that are more skilled in making changes to their targets or in picking the targets could be followed more by other investors and thus become more central in the network as time passes. Prior literature (Zur, 2009; Krishnan et al., 2015) shows a positive relation between the abnormal returns upon the announcement of a campaign and different proxies for the activist's reputation, so it is important to distinguish the effect of connections with other investors from other alternative explanations for superior performance.

To identify the effect of connections, I employ an exogenous shock to the network of activist funds using the turnover of mutual fund managers. Many studies in the prior literature suggest that social ties partially explain the trading behavior and portfolio allocations of asset managers, including both mutual funds and hedge funds (Shiller and Pound, 1989; Cohen et al., 2008; Pareek, 2012; Gerritzen et al., 2016). Because activist investors are likely to establish connections with specific fund managers, the turnover of such managers could result in the loss of connections for an activist. At the same time, since activists' targets constitute less than 1% of mutual fund portfolios, turnover of mutual fund managers is likely to be exogenous in that it is unrelated to the activist's performance. In Section 6.3, I conduct a placebo test to further alleviate the concern that fund manager turnovers may not be exogenous. Therefore, showing that such turnover negatively affects the activist's campaigns can help establish a causal effect of connections on the activist's performance and rule out alternative explanations.

In the remainder of this section, I first verify that turnover of mutual fund managers indeed af-

fects funds' relationships with activists, and then describe the empirical design based on managerial turnover that I use to establish the causal effect of connections. Then, in Section 5, I apply this design to derive my main results about the role of connections for short-run and long-run performance of the campaigns and the channels behind this effect.

4.1. *Losing Connections and Funds' Investments*

To justify the use of mutual fund manager turnovers as shocks to activists' connections, I start by showing that these turnovers have a significant impact on both the activist's engagements and on mutual funds' investment strategy. In particular, I provide evidence that 1) firms owned by investors connected to an activist are more likely to be targeted by that activist, and 2) mutual funds increase their ownership in firms that are targeted by an activist to which they are connected.

To show these results, I first define a connection between an activist and a mutual fund as being partially "lost" if the mutual fund experienced managerial turnover since the time when the connection was established. This definition is illustrated in Figure 2. In particular, suppose that activist fund 3's campaign in target B is announced at time t, and suppose that mutual fund 2 significantly increased its ownership in one of the activist's targets over the last five years, so that $x_{23} = 1$. Suppose that the last co-investment of the mutual fund in the activist's targets (target A in Figure 2) occurred at time $\hat{t}$ during the (t-5, t) period. Then, I define the connection between the activist and the mutual fund as being partially "lost" at time t if the mutual fund experienced managerial turnover during the ($\hat{t}$, t) period. More specifically, I define the percentage loss in connections between the activist and the mutual fund at time t as the percentage of managers in the mutual fund that worked at the fund at time $\hat{t}$ but no longer work in the fund at time t.

Targeting Firms Owned by Connected Investors

To show that connections lost due to mutual fund manager turnovers affect the likelihood of the firm being targeted by the activist, I consider a sample that includes both firms targeted by activists

and, as control firms, firms in the same industry and in the same five by five portfolio formed on size and book-to-market as activists' targets. I use the following regression:

$$\begin{aligned} \text{Target}_{ijt} =& \beta_1 \text{Connection Dummy}_{ijt} + \beta_2 \text{Connection Dummy}_{ijt} \times \text{Lost Connections}_{ijt} + \\ & \rho Z_t + \theta_{\text{Firms}_{jt}} + \gamma_t + \lambda_{\text{Ind}_j} + \sigma_{ijt} \end{aligned} \tag{4}$$

where Target_{ijt} is a dummy variable with a value of one if firm j is targeted by activist i at time t. $\text{Connection Dummy}_{ijt}$ is a dummy variable that captures the connection (as defined in Section 3.1) between the activist and investors that had significant ownership (greater than 1%) in firm j at some point over the three year period before the activism announcement or the three month period after the announcement. The key variable is $\text{Lost Connections}_{ijt}$, which is equal to the percentage of connections between the activist and past and current significant investors of the target that are lost due to manager turnovers at those investors, where lost connections are defined above. This specification corresponds to the first two columns in Panel A of Table 4. These regressions show that being connected to an activist through large shareholders increases the likelihood of a firm being an activist's target by 8.2 percentage points. However, the coefficient on $\text{Connection Dummy} \times \text{Lost Connections}$ is negative with a similar magnitude as the coefficient on the Connection variable, which means that having a connection with another financial institution matters only if the institution still has the same managers as the ones at the time when the connection (co-investment in a target) last occurred.

In the last two columns in Panel A of Table 4, I replace the variables $\text{Connection Dummy}_{ijt}$ and $\text{Lost Connections}_{ijt}$ by $\text{PIConnection Dummy}_{ijt}$ and $\text{Lost PIConnections}_{ijt}$ ("Past Investor Connection Dummy" and "Lost Past Investor Connections") to focus only on past owners of the firm, those that had significant ownership in the target at some point over the three year period before the activism announcement but exited the target before the announcement. As explained in Section 5.2 below, I will later use these regressions to explore the channels behind the effects and identify the information-gathering channel.

Investing in Firms Targeted by a Connected Activist

The following regression tests the effect of connections between major shareholders and a hedge fund activist on the investment decisions of connected investors.

$$\begin{aligned}\text{Connected Ownership}_{ijkt} =& \beta_1 \text{Connection}_{ikt} + \beta_2 \text{Connection}_{ikt} \times \text{Lost Connections}_{ikt} \\ &+ \rho Z_t + \theta_i + \gamma_t + \lambda_{\text{Ind}_j} + \sigma_{ijkt}\end{aligned} \tag{5}$$

where $\text{Connected Ownership}_{ikt}$ is the change in the ownership of connected investor k in firm j targeted by activist i over a three-month period around the announcement of the campaign at time t. I use two different measures of Connected Ownership: one ("Percentage Change") looks at the percentage point change in the ownership of connected investors, and the other ("Change Dummy") is a dummy variable equal to one if the connected investor increases its ownership. Connection_{ikt} is a dummy variable equal to one if investor k is connected to activist i.

$\text{Lost Connections}_{ikt}$ is equal to the percentage of connections between activist i and fund k that is lost due to manager turnovers at fund k. The sample I use to run this test includes all firms in the portfolios of investors connected to hedge fund activists, including both targeted and non-targeted firms. Panel B in Table 4 shows that mutual funds are more likely to invest or increase their ownership in firms that are targeted by a connected activist. On average, the likelihood of increasing ownership is by 8.6 percentage points higher when there is a connection between that investor and the activist hedge fund. Importantly, similar to Panel A, the coefficient on the interaction term with lost connections is negative with a similar magnitude, implying that the result is not significant when the connection was lost due to fund manager turnover.

Overall, these results verify that lost connections due to fund manager turnover are important both for activists' and mutual funds' investment decisions. I next introduce identification variables that allow me to use manager turnovers as shocks to activists' centrality.

4.2.*Identification Variables*

Suppose activist i has a connection with mutual fund j at time t ($x_{ijt} = 1$), and the last co-investment of fund j in the activist's targets over the (t-5, t) period occurred at time $\hat{t}$. Following the previously introduced definition, define γ_{jt} as the percentage number of managers who worked at fund j at time $\hat{t}$ but no longer work in the fund at time t. Then, Lost Degree_{it} denotes the percentage of connections that Fund i has lost due to managerial turnovers in connected mutual funds:

$$\text{Lost Degree}_{it} = \frac{1}{\text{Degree}_{it}}\left(\sum_{j \in N_i} \gamma_{jt} x_{ijt}\right) \times 100 \tag{6}$$

Similarly, to determine the importance of lost connections, I define the variable $\text{Lost Eigenvector}_{it}$ that calculates the percentage change in Eigenvector score after excluding the connections with mutual fund managers that have experienced a turnover:

$$\text{Lost Eigenvector}_{it} = \frac{1}{\text{Eigenvector}_{it}}\left(\lambda \sum_{j \in N_i} \gamma_{jt} x_{ijt} \text{Eigenvector}_{jt}\right) \times 100 \tag{7}$$

4.3. *Summary Statistics of Connection Loss*

The number of observations in which the hedge fund activist experienced a connection loss due to mutual fund manager turnovers is 368, which constitutes 25.4% of the sample. Panel A of Table 5 shows that in the subsample of hedge funds that have experienced a loss in their connections due to mutual fund manager turnovers, the average number of connections that an activist loses is one. This corresponds to a 1.4% decrease in Degree centrality and a 4.55% decrease in Eigenvector centrality. The average loss in connections with mutual funds rises to 13.78% for Eigenvector centrality if connections are weighted by investors' percentage of ownership in activists' targets. Therefore, losing connections with mutual funds becomes even more important when positions of these mutual funds and their participation in activists' engagements are incorporated in the calculation of centrality measures (I use these measures in robustness tests).

In Panel B, I compare characteristics of the firms targeted by activists that have lost connections with mutual funds and those targeted by activists not affected by turnovers in mutual funds. The comparison shows that there are significant differences between the first group and the second group regarding size, R&D, Cash Flow, Book to Market Ratio, and liquidity. These numbers are in line with the hypothesis that losing connections affects the activist's choice of targets.

To make the interpretation of the results simpler, I normalize the centrality measures and the loss in centrality measures by their mean and standard deviation. The key independent variable in the main results, presented in Section 5, is the change in the simple weighted centrality measures based on mutual fund manager turnovers.

5 Effects of Losing Connections on Activist Campaigns

This section presents the main results of the paper. In Section 5.1, I analyze the effects of losing connections with other investors on the short-term and long-term campaign performance using the identification variables introduced in Section 4 as the main independent variables. In Section 5.2, I examine the channels that explain these effects.

5.1. *Campaign Performance*

5.1.1. *Announcement Return*

To test whether losing connections due to mutual fund manager turnovers is associated with a lower abnormal return, I first provide graphical evidence in Figure 4. It presents the buy and hold abnormal return around activist engagement announcements for activists who experienced a loss in connections due to mutual fund manager turnovers (dashed line) and those that did not (solid line). The figure shows that activists with lost connections experience a significantly lower market reaction to the announcement of their campaigns than those without lost connections. The bottom figure is similar to the top figure but visually separates the announcement return into the

pre-announcement and post-announcement parts to show that most of the effect occurs in the pre-announcement period.

To verify these results more formally, I estimate the following regression in Table 6:

$$\begin{aligned} CAR_{ijt} =& \beta_1 Percentage\ of\ Lost\ Centrality_{it} \\ &+ \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt} \end{aligned} \tag{8}$$

$Percentage\ of\ Lost\ Centrality_{it}$ is either $Lost\ Degree_{it}$ or $Lost\ Eigenvector_{it}$ and describes the percentage of activists' connections that is lost due to manager turnovers in mutual funds. The remaining variables are the same as those explained in Section 3.

Coefficients on the key independent variable show that a one standard deviation increase in lost connections is associated with a 2.5% decrease in the abnormal return in a twenty-day window around the announcement (CAR (-20, +20)) and a 1.8% decrease in abnormal return in a ten-day window around the announcement (CAR (-10, +10)). Moreover, as models (5)-(8) show, most of this effect is coming from the pre-announcement period. These results confirm my findings in the previous section and suggest that the effect of connections on the announcement return is likely to be causal.

5.1.2.*Long-term Performance*

I next use alternative measures of performance to show that connections with other investors also positively affect the long-term (stock and operating) performance of activists' targets and the success rate of their campaigns. To examine the long-term effects of connection loss on activist campaigns, I test the following regression:

$$\begin{aligned} Long-Term\ Performance_{ij} =& \beta_1 Percentage\ of\ Lost\ Centrality_{it} \times 1_{t+1} \\ &+ \beta_2 Percentage\ of\ Lost\ Centrality_{it} \times 1_{t+2} \\ &+ \beta_3 Percentage\ of\ Lost\ Centrality_{it} \times 1_{t+3} \\ &+ \rho Z_t + Year\ Dummies + \eta_j + \gamma_t + \theta_i + \lambda_{Ind_j} + \sigma_{ijt} \end{aligned} \tag{9}$$

where 1_{t+1}, 1_{t+2}, and 1_{t+3} are dummy variables that represent the first year after an announcement, the second year after an announcement, and the third year after an announcement, respectively. Results in Table 7 provide evidence that losing connections is associated with both a less positive long-term return and less positive changes in operating performance (ROA).

In Table 8, I show that a one standard deviation loss in the connections of an activist results in a 3.8% decrease in the likelihood of being successful, where a campaign is defined as successful if the activist either achieved the goals stated in the 13D filing or settled with management. The results are both economically and statistically more significant when I test the incremental effect of connection loss on the campaign's success rate in the subsample of hostile engagements. Overall, my results establish a positive and significant effect of connections on both the short-run and long-run performance of activist campaigns.

5.2. *Channels of the Effect*

As discussed in the introduction, the two likely channels that explain the positive effect of connections is that connections (1) help activists pick better targets for intervention (information-gathering channel) and (2) allow them to get higher support in their campaigns (support channel). One other possible channel is that connections with other investors help the activist identify profitable trading opportunities more generally, rather than profitable targets for intervention per se. In this section, I first rule out this third possible channel ("trading skills" channel) and then provide evidence in favor of the first two channels.

5.2.1. *Trading Skills*

To rule out the hypothesis that better short-term performance of central activists is due to their superior trading skills (unrelated to activism) that come from connections to other investors, I investigate the difference between the effect of losing connections for active engagements (13D filings) and passive engagements (13G filings). I estimate the following regression in the sample of

both active and passive engagements and present the results in Table 9.

$$\begin{aligned} CAR_{ijt} =& \beta_1 \text{Percentage of Lost Centrality}_{it} + \\ & \beta_2 \text{Percentage of Lost Centrality}_{it} \times \text{13D Dummy}_{ijt} \\ & + \text{13D Dummy}_{ijt} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt} \end{aligned} \tag{10}$$

The coefficient on $\text{Percentage of Lost Centrality}_{it}$ is insignificant and the coefficient on the interaction term is negative and significant, which shows that losing connections affects the announcement return around the activist's filing only when the activist has an activism intention. These findings are inconsistent with the "trading skills" hypothesis.

In addition, following (Brav et al. (2008)), I look at the market reaction to engagement announcements for which the activist's ownership in the target has already been revealed through the activist's 13F filing. The idea is that if the market reaction to the activist's campaign is due to the inference that the firm may be undervalued per se, rather than the anticipation that the activist will improve the firm, then such reaction will be more muted if the activist's ownership has already been revealed. Coefficients in Table A11 in the Appendix show that the market is more enthusiastic about activism announcements by more central activists even if the activist's ownership information has already been revealed through the 13F filing.

5.2.2.*Obtaining Information about Potential Targets*

One of the ways that an activist might benefit from having connections with other investors is obtaining useful information before picking a target about which targets present the best opportunities for intervention. To distinguish this information-gathering channel from the support channel, I define a "past" investor as an investor that had significant ownership (greater than 1%) in the firm at some point over the three year period before the activism announcement but exited the firm before the announcement. In Section 4, panel A of Table 4, columns (3)-(4), I show that a connection between an activist and one of the past investors of a firm increases the activist's propensity to target that firm. Because these past investors have already exited the target, this effect cannot be

explained by the anticipated higher support from connected investors. In a similar vein, in Table 10, I show that having a connection with one of the target's past investors helps the activist run a more successful campaign: such connections positively affect both the announcement return and the success of the campaign. The coefficient on the interaction term shows that if an activist loses its connection with a past investor because of manager turnover at a connected mutual fund, the effect is insignificant, suggesting that the effect of connections is causal.

Together, these results back the information-gathering channel, whereby private communication between activists and connected investors helps the activist pick better targets for its campaigns.

5.2.3.*Receiving Support from Other Investors*

Other Investors' Ownership

In this section, I provide evidence that central activists are followed by more investors in their engagements. Because investors that increase their ownership in the target around the campaign announcement are likely to support the activist in its engagement, these results are consistent with the support channel. I estimate the following regression model in Table 11:

$$\begin{aligned}\text{Other Investors}_{ijt} =& \beta_1 \text{Centrality Measure}_{it} + \beta_2 \text{Percentage of Lost Network}_{it} \\ &+ \rho Z_t + \theta_i + \gamma_t + \lambda_{\text{Ind}_j} + \sigma_{ijt}\end{aligned} \tag{11}$$

where $\text{Other Investors}_{ijt}$ captures different aspects of other investors' involvement in activist i's campaign in firm j at time t, such as the number of investors who invest or significantly increase their ownership in the target shortly before or shortly after the announcement of the campaign For example, the last two columns of Table 11 indicate that a one standard deviation increase in lost connections is associated with 0.77 fewer investors that increase their ownership significantly around the activism announcement, and this number is 0.32 for investors that have invested in at least one of the activist's previous engagements. In a similar vein, results in Table 12 show that activists that have lost connections with mutual funds are attracted to firms with less mutual fund

ownership and that mutual funds increase their ownership less after the announcement by these activists.

Engagements Features

Another way to show that more central activists enjoy stronger support from other shareholders is to examine the effect of connection loss on both the purposes and tactics of the engagements. Table 13 shows that a one standard deviation increase in connection loss is associated with a 14.2 percentage point decrease in the likelihood of the activist choosing a hostile tactic, where a tactic is defined as hostile if the activist starts a proxy fight or threatens the management with launching a proxy fight. The fact that the effect is slightly smaller on the initial tactic (at the time of the campaign announcement) suggests that activists are likely to change their tone after receiving more support from other shareholders. Table 14 shows that a one standard deviation increase in connection loss measured by Degree centrality is associated with a 3.4 percentage point higher probability of not choosing a specific purpose for the engagement and that an activist that experiences a loss in connections is less likely to choose business strategy and capital structure related goals. The results are in the same direction but insignificant if I use Eigenvector centrality measures.

6 Robustness Tests

6.1.*Connection Loss and Percentage of Ownership*

One of the counter arguments that might explain my results is based on the size of ownership by the activist. If central activists acquire smaller stakes in their targets than peripheral activists, the market could be more surprised by the announcement of their campaigns, leading to a stronger market reaction around the announcements. Results in Table A2 reject this hypothesis by showing that the effect of centrality on the activist's ownership in the target is positive, rather than negative, and is not economically significant. In unreported results, I also repeat the main tests after

controlling for the activist's ownership in the target and show that the results are not affected.

6.2. *Different Definitions of Connections*

It is important to show that my results do not depend on the way that I define connections among investors. Therefore, I build the same centrality measures as before but based on the networks in which links are weighted by the number of connections between investors and the average increase in the percentage of ownership of investors around the engagements. In particular, if two investors invest in the same activism targets repeatedly, the link between them is stronger compared to the relationship between two investors that invest in the same target just once. The link could also be stronger if they acquire a larger number of shares in activism targets, i.e., two block holders are more connected to each other than two shareholders with only a few shares.

In Tables A4 and A7 in the Appendix, I replicate the main results in this paper using centrality measures calculated based on percentage weighted connections and number weighted connections. The results of the tests with number weighted and percentage weighted centrality measures are more significant both economically and statistically.

6.3. *Connections Based on the Pre-announcement Period*

My main measure of connections is based on significant increases in target ownership in the six-month period around the engagement announcement. However, if an activist has established a reputation for running successful campaigns, then some institutions may increase their ownership in the activist's target after the public announcement of a new campaign, even if they do not have a connection to that activist. To address the concern that some post-announcement investments could be coming from non-connected institutions, I redefine connections by focusing only on increases in target ownership that occurred in the three-month period before the announcement. Since these investments were made before any public revelation about the activist's campaign, it is very likely that they came from connected institutions, who got tips from the activist about the upcoming

campaign. I then redefine my measures of centrality using the new definition of connections. Tables A12 and A13 show that the coefficients of the main variables stay significant both economically and statistically if I use this alternative definition of connections and network centrality.

6.4.*Pseudo Activism Engagements*

One alternative explanation for the positive effect of connections on the announcement returns is based on the type of investors that buy targets at a similar point in time. It could be that investors who co-invest in the same targets simply follow the same trading strategies. In this case, mutual fund manager turnover in connected investors could reduce the number of investors trading in the same direction as the activist, resulting in a lower abnormal return around the campaign announcement.

Another potential counterargument for the use of mutual fund manager turnovers as exogenous shocks to activists' connections is the correlation between the quality of the activist and the quality of mutual fund managers connected to the activist. If activists of poor quality are more likely to be connected to mutual fund managers with poor performance, such activists are more likely to experience a loss in connections due to fund manager turnover. Thus, the negative effect of connection loss on the activist's performance could reflect the poor quality of the activist, rather than the effect of connections per se.

One way to reject both of these counterarguments is to test similar effects in a non-activism sample. If the association between centrality in the investor network and performance exists regardless of the investment type, then I should find similar results for hedge funds buying shares without any activism agenda. I, therefore, perform a placebo test by constructing a "pseudo activism" sample using the data on long-short equity hedge funds from Lipper/TASS. I define a "pseudo activism" engagement as the situation when a long-short equity hedge fund significantly increases its holdings of a stock (between 3 and 5 percentage points). I require two conditions in constructing this sample. First, it should be the first time that the market knows about a significant change in the hedge fund's portfolio, and second, it should not end in an activist campaign or involve another activist.

In the next step, I create centrality measures and identification variables in the same way that I build them for the main sample. Table A5 presents results of this section, where the sample includes both the activism sample and the pseudo-activism sample. These results indicate that the effect of connections on the target's short-run performance is significant only when a hedge fund is running an activist campaign, but not for the pseudo sample, refuting the two alternative explanations.

6.5.*Different Definitions of the Identification Variable*

In this section, I show that my results remain robust if I use the identification variables defined differently from the way I describe in section 3. I use the level of lost connections instead of the percentage and show that results of the connection loss continue to hold. These results are more significant when I control for the level of the activist's centrality (see Table A6). Finally, in Table A14, I show that the results are robust if I use the ratio of the number of manager turnovers to the total number of managers involved in each connection to calculate the connection loss.

6.6.*Filtered Turnover Sample*

Fund managers experience different roles through their careers, and many of them work for more than one fund or different financial institutions as a portfolio manager. Therefore, hedge fund activists might keep their connection with the fund family if that manager stay as a portfolio manager in the mutual fund family or they might form a connection with a new institution if the fund manager takes a position in another fund family. To tackle this issue, I manually collect information on the career development of fund managers who increased the fund ownership in an activist's target around the campaign announcement and left the fund during five years after that campaign. I use four sources to track mutual fund managers after they leave the mutual fund. The first source is managers' Linkedin accounts. If they do not have an account, I check Morningstar database on mutual fund managers and Bloomberg website to find their employment records. Finally, I check the news articles and SEC filings by the mutual funds around the time of the turnover. The initial

sample of manager turnovers consists of 531 turnovers between 1994 and 2007. I categorize these turnovers into six different groups. The first group includes 292 manager turnovers in which managers resigned, joined a small fund, acceded to another fund with a different style of investment or under a different title, or I could not track the manager after her turnover. The second group consists of 62 turnovers in which managers retired or died. The third group includes 19 turnovers in which the manager stayed in the same family but not as a portfolio manager. The 93 manager turnovers in which the manager stayed in the same family as a portfolio manager or joined another fund as a portfolio manager shape the fourth group. Finally, I put 65 turnovers for which I could not find the manager in the mentioned databases in the fifth group. I filtered out the fourth group from the sample to make sure that the turnover disconnects the link between the activist and the mutual fund. Table A15 shows that for the filtered subsample of turnovers, the engagement announcement effects are stronger (both economically and statistically) than for the unfiltered subsample. [16]

7 Conclusion

Hedge fund activism has emerged as a prominent and powerful force in corporate governance. Other types of institutional investors have started working along with shareholder activists and supporting them during their campaigns. In this paper, I focus on the role of non-activist investors in activist engagements and in particular, analyze the effect of built connections among investors on future engagements. Employing centrality measures from the Social Network Analysis, I find that activists that are more central in the investor network experience both a higher market reaction to announcements of their engagements and better long-run performance of their targets. To rule out alternative explanations for the positive relation between the success of activist campaigns and centrality measures, I use mutual fund manager turnovers as exogenous shocks to the activists' net-

[16] I also repeat the tests on the long-term effects of campaigns and find similar magnitudes. Finally, I also test the main results excluding the turnovers for which I could not find the managers and find similar results.

work connections. I find that activist investors that have experienced a loss in their connections due to mutual fund manager turnovers receive less positive reaction from the market around their activist campaign announcements and experience a smaller abnormal return during the first year after the announcement. I also find that these activists are, on average, less successful in achieving their goals and improving the operating performance of their targets. My analysis provides support for two likely mechanisms that explain these results: gathering information prior to targeting a firm and receiving support from other investors when running an activist campaign. In particular, consistent with the information-gathering channel, I show that if an activist has a relationship with one of the past block holders of that company, its propensity to target a firm increases and it is more likely to run a successful campaign. Consistent with the support channel, I show that well-connected activist hedge funds are followed by more institutional investors after the announcement and are more likely to choose a hostile tactic for their campaigns. Overall, these findings emphasize that connections to other institutions are important factors in hedge funds' activist campaigns and benefit activist investors.

References

Appel, I., T. A. Gormley, and D. B. Keim. 2016. Standing on the shoulders of giants: The effect of passive investors on activism. *Available at SSRN 2693145* .

Artiga González, T., and P. Calluzzo. 2016. Clustered Shareholder Activism .

Bajo, E., T. J. Chemmanur, K. Simonyan, and H. Tehranian. 2016. Underwriter networks, investor attention, and initial public offerings. *Journal of Financial Economics* 122:376–408.

Bebchuk, L. A., A. Brav, and W. Jiang. 2015. The long-term effects of hedge fund activism. Tech. rep., National Bureau of Economic Research.

Bonacich, P. 1972. Factoring and weighting approaches to status scores and clique identification. *Journal of Mathematical Sociology* 2:113–120.

Boyson, N. M., L. Ma, and R. M. Mooradian. 2016. Serial activists .

Boyson, N. M., and P. Pichler. 2016. Hostile resistance to hedge fund activism .

Brav, A., A. Dasgupta, and R. D. Mathews. 2016. Wolf pack activism. *Robert H. Smith School Research Paper No. RHS* 2529230.

Brav, A., W. Jiang, H. Kim, et al. 2010. Hedge fund activism: A review. *Foundations and Trends® in Finance* 4:185–246.

Brav, A., W. Jiang, F. Partnoy, and R. Thomas. 2008. Hedge fund activism, corporate governance, and firm performance. *The Journal of Finance* 63:1729–1775.

Clifford, C. P. 2008. Value creation or destruction? Hedge funds as shareholder activists. *Journal of Corporate Finance* 14:323–336.

Cohen, L., A. Frazzini, and C. Malloy. 2008. The small world of investing: Board connections and mutual fund returns. *Journal of Political Economy* 116:951–979.

Colla, P., and A. Mele. 2010. Information linkages and correlated trading. *Review of Financial Studies* 23:203–246.

Crane, A. D., A. Koch, and S. Michenaud. 2016. Institutional Investor Cliques and Governance .

Doidge, C., I. Dyck, H. Mahmudi, and A. Virani. 2015. Can Institutional Investors Improve Corporate Governance Through Collective Action? *Hamed and Virani, Aazam, Can Institutional Investors Improve Corporate Governance Through Collective Action* .

El-Khatib, R., K. Fogel, and T. Jandik. 2015. CEO network centrality and merger performance. *Journal of Financial Economics* 116:349–382.

Foroughi, P., N. Kang, G. Ozik, and R. Sadka. 2016. Investor Protection and the Long-Run Performance of Activism .

Gantchev, N., and C. Jotikasthira. 2017. Institutional trading and hedge fund activism. *Management Science* .

Gerritzen, M., J. C. Jackwerth, and A. Plazzi. 2016. Birds of a Feather–do Hedge Fund Managers Flock Together? *Available at SSRN 2729993* .

Gillan, S., and L. T. Starks. 2007. The evolution of shareholder activism in the United States. *Available at SSRN 959670* .

Gillan, S. L., and L. T. Starks. 2000. Corporate governance proposals and shareholder activism: The role of institutional investors. *Journal of financial Economics* 57:275–305.

Greenwood, R., and M. Schor. 2009. Investor activism and takeovers. *Journal of Financial Economics* 92:362–375.

Grinblatt, M., and M. Keloharju. 2001. How distance, language, and culture influence stockholdings and trades. *The Journal of Finance* 56:1053–1073.

Han, B., and L. Yang. 2013. Social networks, information acquisition, and asset prices. *Management Science* 59:1444–1457.

He, Y. E., and T. Li. 2016. The benefits of friendship in hedge fund activism .

Hochberg, Y. V., A. Ljungqvist, and Y. Lu. 2007. Whom you know matters: Venture capital networks and investment performance. *The Journal of Finance* 62:251–301.

Hong, H., J. D. Kubik, and J. C. Stein. 2005. Thy neighbor's portfolio: Word-of-mouth effects in the holdings and trades of money managers. *The Journal of Finance* 60:2801–2824.

Kelly, M., and C. Ó. Gráda. 2000. Market Contagion: Evidence from the Panics of 1854 and 1857. *American Economic Review* pp. 1110–1124.

Klein, A., and E. Zur. 2009. Entrepreneurial shareholder activism: Hedge funds and other private investors. *The Journal of Finance* 64:187–229.

Kostovetsky, L., and J. B. Warner. 2015. You're fired! New evidence on portfolio manager turnover and performance. *Journal of Financial and Quantitative Analysis* 50:729–755.

Krishnan, C., F. Partnoy, and R. S. Thomas. 2015. Top hedge funds and shareholder activism. *Available at SSRN 2589992* .

Larcker, D. F., E. C. So, and C. C. Wang. 2013. Boardroom centrality and firm performance. *Journal of Accounting and Economics* 55:225–250.

Ozsoylev, H. N., and J. Walden. 2011. Asset pricing in large information networks. *Journal of Economic Theory* 146:2252–2280.

Ozsoylev, H. N., J. Walden, M. D. Yavuz, and R. Bildik. 2014. Investor networks in the stock market. *Review of Financial Studies* 27:1323–1366.

Pareek, A. 2012. Information networks: Implications for mutual fund trading behavior and stock returns. In *AFA 2010 Atlanta Meetings Paper*.

Shiller, R. J., and J. Pound. 1989. Survey evidence on diffusion of interest and information among investors. *Journal of Economic Behavior & Organization* 12:47–66.

Walden, J. 2014. Trading, profits, and volatility in a dynamic information network model. *Available at SSRN 2561055* .

Zur, E. 2009. The power of reputation: Hedge fund activists. AAA.

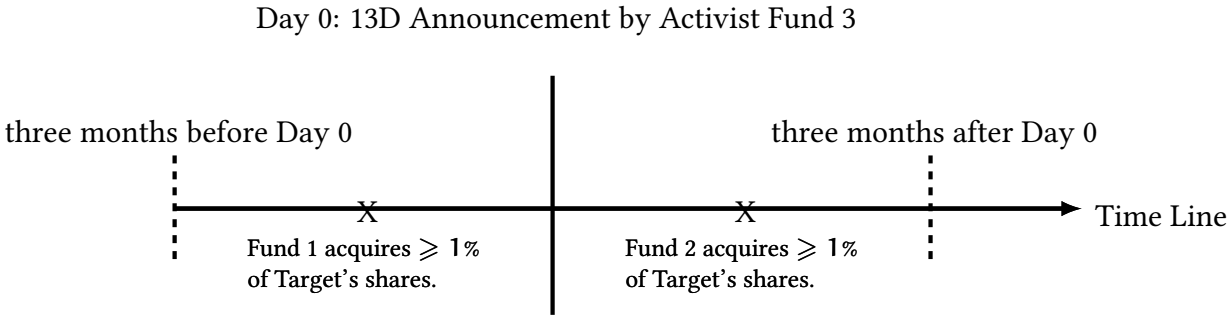


Figure 1: Time Line for Connections

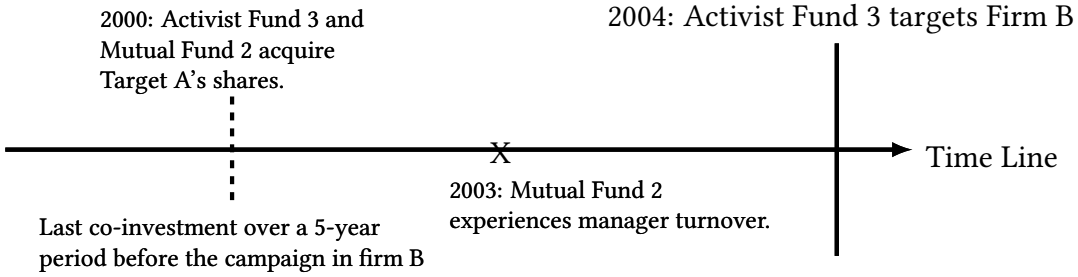


Figure 2: Time Line for Connection Loss

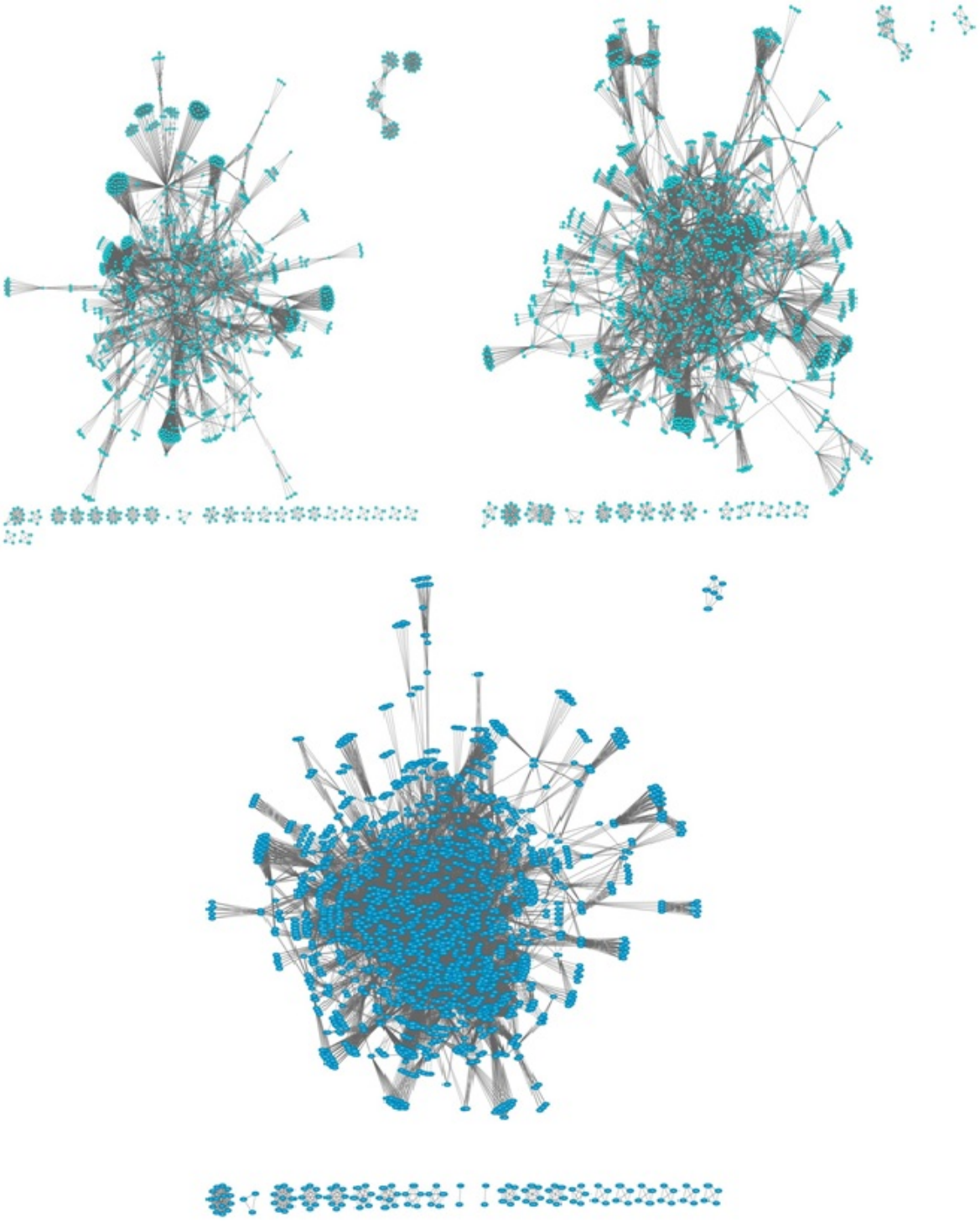


Figure 3: Investor Network in 2001, 2005 and 2008

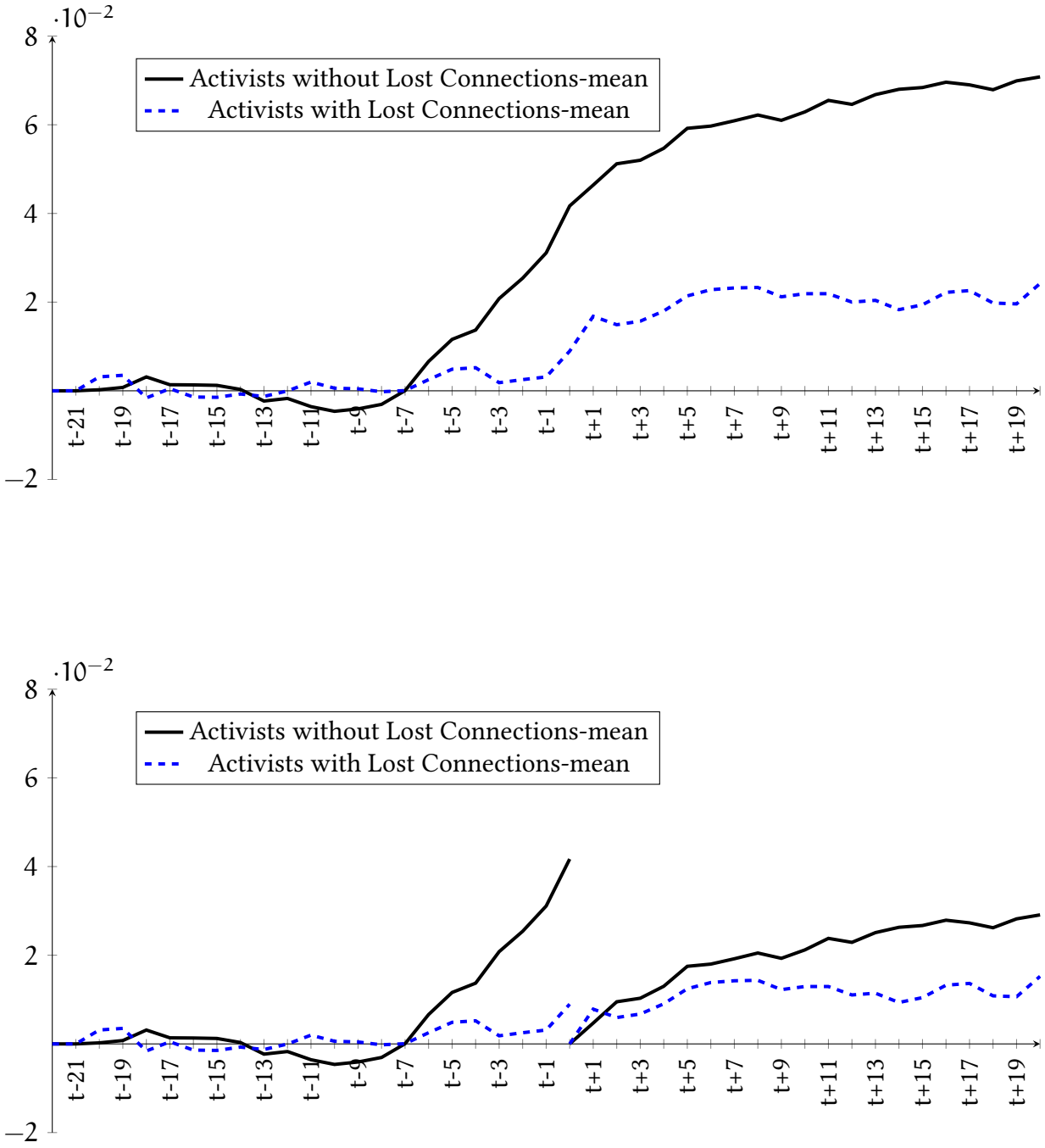


Figure 4: Buy and Hold Abnormal Return around announcements: Activists that have experienced connection loss vs. other activists

Table 1: General Descriptive Statistics

The sample consists of hedge fund activist engagements announced between 1999 and 2007. Market Value is defined as market capitalization in millions of dollars. Growth is equal to the growth rate of sales over the last year to the activist engagement announcement. Cash Flow is defined as (net income + depreciation and amortization)/lagged assets. Leverage Ratio is the book leverage ratio defined as debt/(debt + book value of equity). Cash Ratio is equal to (cash + cash equivalents)/assets. R&D ratio is calculated by dividing R&D expenses in COMPUSTAT by lagged asset value. Long-Term Debt is defined as long-term debt over market value of assets. Tobin's Q is equal to (book value of debt + market value of equity)/(book value of debt + book value of equity). Book to Market Ratio is (book value of equity/market value of equity). Amihud is defined as the yearly average of $\sqrt{(1000|\mathtt{Return}|/(\mathtt{DollarTradingVolume}))}$. No. of Past Engagements captures the number of previous activist engagements announced by a hedge fund activist in the sample. Last Announcement Return is equal to abnormal market reaction (CAR(-20,+20)) to the previous engagement announced by the activist. Activist's Size capture the value of the asset under management in the TASS database. CAR(-20,+20) is equal to the abnormal market reaction to engagement announcement, which is computed over the window (-20,+20). CAR(-10,+10) is equal to the abnormal market reaction to engagement announcement, which is computed over the window (-10,+10). Specific Purpose is a dummy variable that identifies whether an activist mentions any goal in item 4 of the 13D filing. Hostile Tactic is a dummy variable that identifies whether an activist uses hostile tactics to achieve its goals. Success Dummy is a dummy variable that identifies whether an activist has been successful in achieving its goals.

Panel A: Control Variables

	Mean	10th	25th	50th	75th	90th	S.D.	N
Ln(Market Value)	5.23	3.08	4.00	5.20	6.44	7.48	1.66	1,104
Growth	0.14	-0.19	-0.04	0.06	0.19	0.47	0.50	1,104
Cash Flow	0.01	-0.20	-0.02	0.05	0.12	0.20	0.25	1,104
Leverage Ratio	0.31	0.00	0.01	0.27	0.53	0.71	0.28	1,104
Cash Ratio	0.20	0.01	0.03	0.10	0.30	0.55	0.22	1,104
R&D Ratio	0.05	0.00	0.00	0.00	0.06	0.16	0.11	1,104
Long-term Debt	0.20	0.00	0.00	0.11	0.34	0.57	0.23	1,104
Tobin's Q	1.89	0.77	1.03	1.41	2.20	3.44	1.53	1,104
Book to Market Ratio	0.91	0.20	0.36	0.60	0.95	1.59	1.35	1,104
Amihud	0.40	0.03	0.06	0.18	0.55	1.15	0.49	1,104

Panel B: Hedge Fund Activist Characteristics

	Mean	10th	25th	50th	75th	90th	S.D.	N
No. of Past Engagements	17.88	1.00	2.00	6.00	16.00	49.00	31.70	1,240
Last Announcement Return	0.04	-0.14	-0.03	0.00	0.11	0.27	0.19	1,240
Activist's Size (Billion Dollar)	4.42	0.16	0.42	1.23	4.80	15.77	7.09	764

Panel C: Hedge Fund Activism Characteristics and Outcome Variables

	Mean	10th	25th	50th	75th	90th	S.D.	N
CAR(-20,+20)	0.06	-0.17	-0.07	0.04	0.15	0.30	0.22	1,196
CAR(-10,+10)	0.06	-0.10	-0.03	0.04	0.12	0.24	0.16	1,196
Specific Purpose	0.51	0.00	0.00	1.00	1.00	1.00	0.50	1,196
Hostile Tactic	0.26	0.00	0.00	0.00	1.00	1.00	0.44	1,196
Hostile Initial Tactic	0.13	0.00	0.00	0.00	0.00	1.00	0.34	1,196
Success Dummy	0.31	0.00	0.00	0.00	1.00	1.00	0.46	1,196

Table 2: Descriptive Statistics-Centrality Measures

The sample consists of hedge fund activist engagements announced between 1999 and 2007. Panel A shows characteristics of the investor network built out of connections based on co-ownership of institutional shareholders that trade actively around activist engagements in a five-year window prior to an activist engagement. *No. of Connections* is equal to the number of other investors that are connected to an activist prior to its current engagement. *Investor Network Size* indicates the total number of investors in the network before an engagement announcement in the sample. *Degree* variable captures the percentage of the investor population that are connected to an activist before the announcement. *Degree Number Weighted* and *Degree Percentage Weighted* are similar to *Degree*, with connections weighted by the number of co-ownerships in different targets by two investors in the network and average size of the ownership in different targets by two investors in the network, respectively. *Eigen Vector* captures the importance of an activist in the network at the time of announcement, weighing connections by the importance of connected investors.

Panel A: Investor Network Characteristics

	Mean	50th	S.D.	N
No. of Connections	64.18	32.00	78.41	1,449
Investor Network Size	766.16	645.00	292.23	1,449
Degree	0.09	0.04	0.12	1,449
Degree Number Weighted	0.14	0.05	0.22	1,449
Degree Percentage Weighted	0.78	0.33	1.15	1,449
Eigen Vector	0.03	0.02	0.04	1,449
Eigen Vector Number Weighted	0.04	0.01	0.06	1,449
Eigen Vector Percentage Weighted	0.02	0.01	0.04	1,449

Panel B: Target Firms' Characteristics and Centrality Measures

Target Firms' Characteristics	Eigenvector 4^{th} Q	Eigenvector 1^{st} Q	Difference
Ln(Market Value)	5.807***	4.240***	1.567***
Growth	0.131***	0.186***	-0.055
Cash Flow	0.025**	-0.069***	0.094***
Leverage Ratio	0.344***	0.294***	0.050**
Cash Ratio	0.179***	0.240***	-0.061***
R&D Ratio	0.047***	0.069***	-0.022**
Long-term Debt	0.210***	0.171***	0.039**
Tobin's Q	1.970***	1.927***	0.043
Book to Market Ratio	0.811***	1.112***	-0.301***
Amihud	0.265***	0.585***	-0.320***
No. of Observations	362	363	

Table 3: Activists' Centrality and Announcements Return

The dependent variables are cumulative abnormal returns around activism announcements. The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Degree centrality and Eigen-vector centrality of the activist, both of which are defined in Section 3. Activist fixed effects, industry fixed effects and year fixed effects are included in all specifications. In all regressions, I control for Target characteristics which are listed and defined in the Variables Definition table in the Appendix. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$CAR_{ijt} = \beta_1 Centrality\ Measure_{it} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt}$$

	(1) CAR (-20,+20)	(2) CAR (-10,+10)	(3) CAR (-20,+20)	(4) CAR (-10,+10)
Degree	0.031**	0.026**		
	(2.15)	(2.11)		
Eigen Vector			0.033**	0.029**
			(2.15)	(2.24)
Specific	-0.013	-0.021	-0.013	-0.021
Purpose	(-0.62)	(-1.59)	(-0.62)	(-1.59)
No. of Past	-0.000	-0.000	-0.001	-0.000
Engagements	(-0.52)	(-0.60)	(-0.70)	(-0.83)
Activist Fixed-Effects	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes
Number of Engagements	937	939	937	939
R-Squared	0.067	0.067	0.068	0.069

Table 4: Loss of Connections and Funds' Investments

Panel A shows the effect of connections between an activist and major shareholders in a firm on the likelihood of being targeted by the activist. The sample I used for this test includes both firms targeted by hedge fund activists. ConnectionsDummy is equal to one if there is at least one investor that is connected to the activist and has significant ownership in the firm for at least one quarter during a three-year window before the announcement. Lost Connection captures the percentage of the connections between the activist and investors with significant ownership that is lost due to manager turnovers at mutual funds. Panel B presents the effect of connections between an activist and an investor on the investors' investments in firms targeted by the activist. The sample I use to run this test includes all firms that are owned by investors connected to hedge fund activists. Connection Dummy is equal to one if the investor has a connection to the activist that has targeted the firm.

Panel A: Targeting Firms Owned by Allies

	(1) Past and Current Owners	(2) Past and Current Owners	(3) Past Owners	(4) Past Owners
Connection Dummy	0.086***	0.082***	0.032***	0.035***
	(17.44)	(13.63)	(5.69)	(5.23)
Lost Connections	-0.081***	-0.085***	-0.027**	-0.035**
×Connection Dummy	(-6.51)	(-5.61)	(-2.11)	(-2.30)
Engagement Fixed-Effects	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes
Target Characteristics	No	Yes	No	Yes
Number of Engagements	30,482	20,101	30,482	20,101
R-Squared	0.101	0.122	0.100	0.121

Panel B: Change in Connected Investors' Ownership

	(1) Percentage Change	(2) Percentage Change	(3) Change Dummy	(4) Change Dummy
Connection Dummy	0.279***	0.247***	0.085***	0.086***
	(4.92)	(4.63)	(6.09)	(6.13)
Lost Connections	-0.316***	-0.272***	-0.061*	-0.089**
×Connection Dummy	(-3.29)	(-2.71)	(-1.67)	(-2.23)
Activist Fixed-Effects	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes
Target Characteristics	No	Yes	No	Yes
Number of Engagements	39,350	35,910	39,350	35,910
R-Squared	0.103	0.092	0.148	0.150

Table 5: Descriptive Statistics-Connection Loss

The sample consists of hedge fund activist engagements announced between 1999 and 2007. Panel A shows different measures and characteristics that capture the lost connections between activists and mutual funds due to manager turnovers at these funds. *No. of Lost Connections* is equal to the average number of connections that an activist loses due to manager turnovers at mutual funds. *Lost Degree* variable captures the percentage of *Degree* lost due to the turnovers. *Lost Degree Number Weighted* and *Lost Degree Percentage Weighted* are similar to *Lost Degree* with connections weighted by the number of co-ownerships in different targets by two investors in the network and average size of the ownership in different targets by two investors in the network, respectively. *Lost Eigen Vector* is the percentage of *Eigen Vector* lost due to the turnovers.

Panel A: Connections Loss and Centrality Measures

	Mean	50th	S.D.	N
No. of Lost Connections	1.05	1.00	0.75	368
Lost Degree	1.40	0.87	1.85	368
Lost Degree Number Weighted	1.51	1.28	1.19	368
Lost Degree Percentage Weighted	1.50	1.18	1.40	368
Lost Eigen-Vector	4.55	2.42	5.80	368
Lost Eigen-Vector Number Weighted	14.58	3.33	19.20	368
Lost Eigen-Vector Percentage Weighted	13.78	5.45	16.69	368

Panel B: Target Firms' Characteristics and Connections Loss

Target Characteristics	Loss Dummy=1	Loss Dummy=0	Difference
Ln(Market Value)	5.597***	4.762***	0.835***
Growth	0.173***	0.180***	-0.007
Cash Flow	0.011	-0.033***	0.043***
Leverage Ratio	0.337***	0.317***	0.021
Cash Ratio	0.184***	0.220***	-0.036***
R&D Ratio	0.048***	0.063***	-0.015**
Long-term Debt	0.204***	0.191***	0.012
Tobin's Q	1.836***	1.914***	-0.079
Book to Market Ratio	0.809***	1.017***	-0.208***
Amihud	0.338***	0.484***	-0.147***
No. of Observations	368	1081	

Table 6: Connection Loss and Announcement Return

The dependent variables are cumulative abnormal returns around activism announcements. The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Lost Degree centrality and Lost Eigen-Vector centrality of the activist which show the percentage of the activists' network that is lost due to mutual fund manager turnovers. Activist fixed effects, industry fixed effects and year fixed effects are included in all specifications. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$CAR_{ijt} = \beta_1 Percentage\ of\ Lost\ Centrality_{it} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt}$$

	(1) CAR (-20,+20)	(2) CAR (-10,+10)	(3) CAR (-20,+20)	(4) CAR (-10,+10)	(5) CAR (-20,0)	(6) CAR (+1,+20)	(7) CAR (-20,0)	(8) CAR (+1,+20)
Lost Degree	-0.025***	-0.018***			-0.013**	-0.012*		
	(-2.81)	(-2.81)			(-2.24)	(-1.90)		
Lost Eigen-Vector			-0.027**	-0.018**			-0.018***	-0.008
			(-2.50)	(-2.33)			(-2.62)	(-0.96)
Specific	-0.013	-0.013	-0.009	-0.010	-0.006	-0.015	-0.004	-0.013
Purpose	(-0.69)	(-0.93)	(-0.47)	(-0.72)	(-0.51)	(-1.09)	(-0.33)	(-0.95)
No. of Past	-0.001	-0.001	-0.001	-0.001*	-0.000	-0.000	-0.001	-0.000
Engagements	(-0.89)	(-1.33)	(-1.30)	(-1.71)	(-0.91)	(-0.49)	(-1.29)	(-0.69)
Activist Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Engagements	937	939	937	939	943	937	943	937
R-Squared	0.247	0.249	0.245	0.246	0.213	0.250	0.215	0.247

Table 7: Connection Loss and Long-term Effects

The dependent variable is the industry adjusted ROA in columns (3)-(4) and (7)-(8) and abnormal annual return in columns (1)-(2) and (5)-(6). The sample uses the data on activists' targets three years before and three years after an activism announcement between 1999 and 2007. The main independent variables are Lost Degree centrality and Lost Eigen-vector centrality of the activist, which capture the percentage of the activists' network that is lost due to mutual fund manager turnovers. Times dummy variables that indicate the number of years that has passed since the announcement. Activist fixed effects, Target fixed effects, Industry fixed-effects, year fixed-effects and Pre-event dummy variables are included in all specifications. Standard errors are clustered at the target level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\begin{aligned}\text{Long} - \text{Term Performance}_{ij} =& \beta_1 \text{Percentage of Lost Centrality}_{it} \times 1_{t+1} \\ &+ \beta_2 \text{Percentage of Lost Centrality}_{it} \times 1_{t+2} \\ &+ \beta_3 \text{Percentage of Lost Centrality}_{it} \times 1_{t+3} \\ &+ \rho Z_t + \text{Year Dummies} + \eta_j + \gamma_t + \theta_i + \lambda_{\text{Ind}_j} + \sigma_{ijt}\end{aligned}$$

	(1) Annualized Return	(2) Annualized Return	(3) ROA	(4) ROA	(5) Annualized Return	(6) Annualized Return	(7) ROA	(8) ROA
Lost Degree $\times 1_{t+1}$	-0.052**	-0.056**	-0.013	-0.019				
	(-2.03)	(-2.34)	(-1.43)	(-1.63)				
Lost Degree $\times 1_{t+2}$	-0.021	-0.031	-0.014*	-0.032**				
	(-0.89)	(-1.58)	(-1.69)	(-2.41)				
Lost Degree $\times 1_{t+3}$	0.046	0.036	-0.007	-0.023*				
	(0.63)	(0.54)	(-1.00)	(-1.77)				
Lost Eigen-Vector $\times 1_{t+1}$					-0.081**	-0.051*	-0.020***	-0.049***
					(-2.44)	(-1.83)	(-4.21)	(-4.42)
Lost Eigen-Vector $\times 1_{t+2}$					0.029	0.006	-0.022***	-0.031***
					(0.34)	(0.09)	(-4.17)	(-3.15)
Lost Eigen-Vector $\times 1_{t+3}$					0.071	0.067	-0.013***	-0.047***
					(0.73)	(0.84)	(-2.81)	(-4.39)
1_{t+1}	0.084	0.078	0.034***	0.064**	0.089	0.076	0.036***	0.071**
	(1.35)	(1.38)	(2.69)	(2.29)	(1.44)	(1.35)	(2.81)	(2.49)
1_{t+2}	0.087	0.085	0.042***	0.080***	0.091	0.084	0.046***	0.090***
	(1.52)	(1.56)	(2.60)	(2.74)	(1.59)	(1.55)	(2.74)	(3.00)
1_{t+3}	0.106	0.092	0.041**	0.080**	0.110	0.088	0.046**	0.094***
	(1.49)	(1.40)	(2.13)	(2.38)	(1.55)	(1.33)	(2.31)	(2.69)
Activist Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-event Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Characteristics	Yes	No	Yes	No	Yes	No	Yes	No
Number of Engagements	5,441	6,162	5,854	7,130	5,441	6,162	5,854	7,130
R-Squared	0.229	0.201	0.856	0.459	0.230	0.201	0.856	0.460

Table 8: Connection Loss and Success Rate of the Campaigns

The dependent variable of OLS regressions in this table is a dummy variable that indicates whether or not the activist is successful in its campaigns. The sample consists of hedge fund activism data from 1999 to 2007. The sample is limited to the engagements in which the hedge fund activist has a specific goal at the time of the announcement. The main independent variables are Lost Degree centrality and Lost Eigen-vector centrality of the activist which show the percentage of the activists' network that is lost due to mutual fund manager turnovers. Activist fixed-effects, industry fixed-effects and year fixed-effects are included in all specifications. Standard errors are clustered at the target level, and t statistics are shown in parentheses *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\begin{aligned} Success_{ijt} =& \beta_1 Percentage\ of\ Lost\ Centrality_{it} * Tactic_{ijt} + \\ & \beta_2 Percentage\ of\ Lost\ Centrality_{it} + \beta_3 Tactic_{ijt} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt} \end{aligned}$$

	(1) Success Dummy	(2) Success Dummy	(3) Success Dummy	(4) Success Dummy
Lost Degree	-0.038***		-0.017*	
	(-3.69)		(-1.95)	
Lost Eigen-Vector		-0.032*		-0.008
		(-1.68)		(-0.54)
Lost Degree × Hostile Tactic			-0.287***	
			(-5.38)	
Lost Eigen-Vector ×HostileTactic				-0.187**
				(-2.12)
Hostile Tactic			0.279***	0.303***
			(6.48)	(6.91)
Activist Fixed-Effects	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes
Number of Engagements	996	996	996	996

Table 9: Connection Loss and Passive Investments

The dependent variables are cumulative abnormal returns around passive and active engagements (13G and 13D filings) announced by hedge fund activists. The sample consists of passive and active engagements by hedge fund activists from 1999 to 2007. The main independent variables are Lost Degree centrality and Lost Eigen-vector centrality of the activist which show the percentage of the activists' network that is lost due to mutual fund manager turnovers. Activist fixed-effects, industry fixed-effects and year fixed-effects are included in all specifications. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\begin{aligned} CAR_{ijt} =& \beta_1 \text{Percentage of Lost Centrality}_{it} + \\ & \beta_2 \text{Percentage of Lost Centrality}_{it} \times \text{13D Dummy}_{ijt} \\ & + \text{13D Dummy}_{ijt} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt} \end{aligned}$$

	(1) CAR (-20,+20)	(2) CAR (-10,+10)	(3) CAR (-20,+20)	(4) CAR (-10,+10)	(5) CAR (-20,+20)	(6) CAR (-10,+10)	(7) CAR (-20,+20)	(8) CAR (-10,+10)
13D Dummy	0.022	0.030**	0.023	0.030**	0.022	0.029**	0.020	0.028**
	(1.42)	(2.52)	(1.41)	(2.55)	(1.34)	(2.51)	(1.24)	(2.44)
Lost Degree	-0.015*	-0.004	-0.006	0.003				
	(-1.93)	(-0.60)	(-0.81)	(0.48)				
Lost Degree × 13D Dummy			-0.031***	-0.027**				
			(-2.63)	(-2.34)				
Lost Eigen-Vector					-0.008	-0.003	-0.001	0.003
					(-0.88)	(-0.41)	(-0.06)	(0.34)
Lost Eigen-Vector ×13DDummy							-0.025*	-0.017*
							(-1.68)	(-1.73)
Activist Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Engagements	2,357	2,385	2,357	2,385	2,357	2,385	2,357	2,385
R-Squared	0.154	0.151	0.156	0.154	0.153	0.151	0.154	0.152

Table 10: Loss of Connection with Past Investors

The main dependent variables in this table are cumulative abnormal returns around engagement announcements and activist campaigns' success rate. The sample I used for this test includes both firms targeted by hedge fund activists. PIConnectionsNo. is equal to the number of investors that are connected to the activist and have significant ownership in the firm for at least one quarter during a three-year window before the announcement but exited from their position before the announcement ("past investors"). Lost PIConnection captures the percentage of the connections between the activist and past investors with significant ownership that is lost due to manager turnovers at mutual funds. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\begin{aligned}\text{Outcome}_{ijt} =& \beta_1 \text{PIConnection}_{ijt} + \beta_2 \text{PIConnection}_{ijt} \times \text{Lost PIConnections}_{ijt} + \\ & \rho Z_t + \gamma_t + \lambda_{\text{Ind}_j} + \sigma_{ijt}\end{aligned}$$

	(1) CAR (-20,+20)	(2) CAR (-10,+10)	(3) Success Dummy	(4) CAR (-20,+20)	(5) CAR (-10,+10)	(6) Success Dummy
PIConnections No.	0.013***	0.020***	0.087***	0.018**	0.025***	0.107***
	(2.98)	(5.19)	(9.18)	(2.11)	(4.12)	(9.21)
Lost PIConnections ×PIConnections No.				-0.030	-0.028*	-0.120***
				(-0.95)	(-1.68)	(-3.15)
No. of Past Engagements	-0.001	-0.001**	0.001	-0.001	-0.001**	0.001
	(-1.07)	(-2.52)	(1.36)	(-1.10)	(-2.57)	(1.34)
Activist Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Number of Engagements	937	939	996	937	939	996
R-Squared	0.250	0.248	0.607	0.251	0.249	0.610

Table 11: Connection Loss and Other Investors

The dependent variables in the first four columns are the number of investors that either invest or significantly increase their ownership after the engagement announcement (over the first three months after the announcement, referred to as "followers"), the number of investors that either invest or significantly increase their ownership before the announcement (over the last three months before the announcement, referred to as "leaders"), total number of investors that either invest or significantly increase their ownership in activist's target (in the six-month period around the activism announcement) and the number of investors that either invest or significantly increase their ownership in activist's target and have invested in one of the activist's previous targets, respectively (referred to as "investors with past connections"). The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Lost Degree centrality and Lost Eigen-vector centrality of the activist which show the percentage of the activists' network that is lost due to mutual fund manager turnovers. Activist fixed effects, Industry fixed-effects and year fixed-effects are included in all specifications. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\mathrm{NumberofInvestors}_{ijt} = \beta_1 \mathrm{Percentage\ of\ Lost\ Centrality}_{it} + \rho Z_t + \gamma_t + \theta_i + \lambda_{\mathrm{Ind}_j} + \sigma_{ijt}$$

	(1) No. of Followers	(2) No. of Leaders	(3) No. of Investors	(4) Investors with Past Connections	(5) No. of Followers	(6) No. of Leaders	(7) No. of Investors	(8) Investors with Past Connections
Lost Degree	-0.244	-0.258*	-0.502**	-0.234				
	(-1.50)	(-1.95)	(-1.98)	(-1.43)				
Lost Eigen-Vector					-0.385***	-0.381***	-0.767***	-0.316***
					(-3.11)	(-2.90)	(-3.77)	(-2.67)
Specific	-0.263	0.076	-0.187	0.259	-0.219	0.121	-0.098	0.298
Purpose	(-0.91)	(0.33)	(-0.51)	(1.40)	(-0.76)	(0.52)	(-0.27)	(1.62)
Activist Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Engagements	994	994	994	994	994	994	994	994
R-Squared	0.364	0.343	0.410	0.594	0.366	0.345	0.412	0.595

Table 12: Activists Centrality and Mutual Funds Ownership
The dependent variable in columns (1)-(2) is the percentage of target shares that is owned by mutual funds at the time of the announcement. The change in the percentage of ownership by mutual funds in activists' targets is used as the dependent variable in regressions (3)-(4). The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Lost Degree centrality and Lost Eigen-vector centrality of the activist which show the percentage of the activists' network that is lost due to mutual fund manager turnovers. Activist fixed-effects, industry fixed-effects and year fixed-effects are included in all specifications. In all regressions, I control for Target characteristics which are listed and defined in the variables definition table in the Appendix. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$Mutual\,Funds\,Ownership_{ijt} = \beta_1 Percentage\,of\,Lost\,Centrality_{it} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt}$$

	(1) Mutual Funds Ownership	(2) Mutual Funds Ownership	(3) Change in Mutual Funds Ownership	(4) Change in Mutual Funds Ownership
Lost Degree	-0.778**		-0.669**	
	(-1.99)		(-2.15)	
Lost Eigen-Vector		-1.136**		-1.880***
		(-2.34)		(-2.93)
No. of Past	0.031*	0.018	0.017	-0.000
Engagements	(1.72)	(0.99)	(1.28)	(-0.03)
Activist Fixed-Effects	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes
Number of Engagements	1,036	1,036	1,036	1,036
R-Squared	0.300	0.301	0.049	0.072

Table 13: Connection Loss and Used Tactics in Activism Campaigns
The dependent variables of OLS regressions in this table are dummy variables that indicate whether the activist uses hostile tactics to achieve his goals. The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Lost Degree centrality and Lost Eigenvector centrality of the activist which show the percentage of the activists' network that is lost due to mutual fund manager turnovers. Activist fixed-effects, industry fixed-effects and year fixed-effects are included in all specifications. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\text{Hostility Dummy}_{ijt} = \beta_1 \text{Percentage of Lost Centrality}_{it} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt}$$

	(1) Hostile	(2) Hostile Initial	(3) Hostile	(4) Hostile Initial
Lost Degree	-0.142**	-0.137**		
	(-2.21)	(-2.10)		
Lost Eigen-Vector			-0.150***	-0.129***
			(-3.38)	(-4.18)
No. of Past Engagements	-0.001	-0.002	-0.003	-0.004
	(-0.36)	(-0.87)	(-0.59)	(-1.51)
Activist Fixed-Effects	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes
Number of Engagements	451	451	451	451

Table 14: Connection Loss and the Purpose of Activism Engagements

The dependent variables of OLS regressions in this table are dummy variables that indicate the activist's purpose mentioned in item four of the 13D filing. The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Lost Degree centrality and Lost Eigen-vector centrality of the activist which show the percentage of the activists' network that is lost due to mutual fund manager turnovers. Activist fixed-effects, industry fixed-effects and year fixed-effects are included in all specifications. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\text{Purpose}_{ijt} = \beta_1 \text{Percentage of Lost Centrality}_{it} + \theta_i + \rho Z_t + \gamma_t + \lambda_{\text{Ind}_j} + \sigma_{ijt}$$

	(1) General	(2) Capital Structure	(3) Business Strategy	(4) Sales	(5) Governance	(6) General	(7) Capital Structure	(8) Business Strategy	(9) Sales	(10) Governance
Lost Degree	0.034***	-0.019*	-0.016**	-0.012	-0.018					
	(2.97)	(-1.92)	(-2.23)	(-0.98)	(-1.22)					
Lost Eigen-Vector						0.008	-0.008	-0.021	-0.017	-0.001
						(0.49)	(-0.72)	(-1.44)	(-1.00)	(-0.05)
No. of Past Engagements	0.001	-0.001	-0.000	-0.000	-0.001	0.002	-0.002*	-0.001	-0.000	-0.001
	(1.07)	(-1.60)	(-0.43)	(-0.10)	(-0.55)	(1.25)	(-1.78)	(-0.71)	(-0.28)	(-0.67)
Activist Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Engagements	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105	1,105

Appendices

Table A1: Variable Description

Variable	Definition
Control Variables:	
Market Value	Market capitalization in millions of dollars
Growth	The growth rate of sales over the previous year
Cash Flow	Cash flow is defined as (net income + depreciation and amortization)/assets (lag).
Leverage Ratio	Leverage Ratio is the book leverage ratio defined as debt/(debt + book value of equity)
Cash Ratio	Cash Ratio is defined as (cash + cash equivalents)/assets
R&D to Assets	R&D expenses in COMPUSTAT divided by lagged asset value
Long-term Debt	Long-term debt over market value of assets
Tobin's Q	defined as (book value of debt + market value of equity)/(book value of debt + book value of equity)
Book to Market Ratio	defined as (book value of equity/market value of equity)
Amihud	defined as the yearly average of $\sqrt{(1000\|\mathtt{Return}\|/(\mathtt{DollarTradingVolume}))}$.
Centrality Measures:	
Degree	The number of connections between an activist and other investors in the network.
Eigen Vector	Total number of connections between an activist and other investors in the network wighted by other investors connectedness.
Lost Degree	The percentage of connections that an activist has lost due to mutual fund manager turnovers.
Lost Eigen-Vector	The percentage of Eigenvector centrality that an activist has lost due to mutual fund manager turnovers.
Activism Characteristics and Outcome Variables:	
CAR(-20,+20)	The abnormal market reaction to engagement announcement, which is computed over the window (-20,+20) .
CAR(-10,+10)	The abnormal market reaction to engagement announcement, which is computed over the window (-10,+10) .
Specific Purpose	A dummy variable that identifies whether an activist mentions any goal in the item 4 of the 13D filing.
Hostile Tactic	A dummy variable that identifies whether an activist runs a proxy fight or threats to run a proxy fight during the campaign period.
Hostile Initial Tactic	A dummy variable that shows whether an activist announces a proxy fight or threatens to run a proxy fight in the initial 13D filing.
Success Dummy	A dummy variable that identifies whether an activist has been successful in achieving its goals. A campaign is defined as successful if the activist either achieved the goals stated in the 13D filing or settled with management.

Table A2: Connection Loss and the Percentage of Ownership
The dependent variable is the percentage of stock ownership that activist acquires prior to the announcement. The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Lost Degree centrality and Lost Eigen-vector centrality of the activist which show the percentage of the activists' network that is lost due to mutual fund manager turnovers. Activist fixed-effects, industry fixed-effects and year fixed-effects are included in all specifications. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\text{Percentage of Ownership}_{ijt} = \beta_1 \text{Percentage of Lost Centrality}_{it} + \rho Z_t + \gamma_t + \lambda_{Ind} + \sigma_{ijt}$$

	(1) Percentage of Ownership	(2) Percentage of Ownership	(3) Percentage of Ownership	(4) Percentage of Ownership
Lost Degree	-0.236**		-0.676*	
	(-2.33)		(-1.93)	
Lost Eigen-Vector		-0.307**		-0.447
		(-2.28)		(-1.43)
No. of Past	-0.013	-0.016	-0.045	-0.048
Engagements	(-0.92)	(-1.18)	(-1.48)	(-1.53)
Activist's Size			0.181	0.151
(Billion Dollar)			(1.12)	(0.91)
Activist Fixed-Effects	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes
Number of Engagements	993	993	557	557
R-Squared	0.535	0.535	0.389	0.387

Table A3: Connection Loss (Number-Weighted) and Announcements Return

The dependent variables are cumulative abnormal returns around activism announcements. The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Lost Degree centrality and Lost Eigen-vector centrality of the activist which show the percentage of the activists' network that is lost due to mutual fund manager turnovers and are calculated based on number-weighted connections. Activist fixed-effects, industry fixed-effects and year fixed-effects are included in all specifications. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$CAR_{ijt} = \beta_1 Percentage\ of\ Lost\ Centrality_{it} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt}$$

	(1) CAR (-20,+20)	(2) CAR (-10,+10)	(3) CAR (-20,+20)	(4) CAR (-10,+10)	(5) CAR (-20,+20)	(6) CAR (-10,+10)	(7) CAR (-20,+20)	(8) CAR (-10,+10)
Lost Degree Number Weighted	-0.040***	-0.033***			-0.042***	-0.034***		
	(-3.69)	(-4.34)			(-3.87)	(-4.48)		
Degree Number Weighted					0.032	0.020		
					(1.60)	(1.38)		
Lost Eigen-Vector Number Weighted			-0.047***	-0.023***			-0.043***	-0.021**
			(-3.89)	(-2.75)			(-3.55)	(-2.22)
Eigen Vector Number Weighted							0.028**	0.014
							(2.00)	(1.41)
Specific Purpose	-0.009	-0.011	-0.006	-0.009	-0.008	-0.010	-0.006	-0.021
	(-0.46)	(-0.78)	(-0.29)	(-0.65)	(-0.44)	(-0.76)	(-0.29)	(-1.42)
No. of Past Engagements	-0.001	-0.001	-0.002**	-0.001**	-0.001	-0.001*	-0.003***	-0.001*
	(-1.13)	(-1.54)	(-2.06)	(-2.13)	(-1.48)	(-1.82)	(-2.81)	(-1.76)
Activist Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Engagements	937	939	937	939	937	939	937	939
R-Squared	0.252	0.259	0.254	0.248	0.255	0.261	0.258	0.268

Table A4: Connection Loss (Percentage-Weighted) and Announcements Return

The dependent variables are cumulative abnormal returns around activism announcements. The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Lost Degree centrality and Lost Eigen-vector centrality of the activist which show the percentage of the activists' network that is lost due to mutual fund manager turnovers and are calculated based on percentage-weighted connections. Activist fixed-effects, industry fixed-effects and year fixed-effects are included in all specifications. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$CAR_{ijt} = \beta_1 Percentage\ of\ Lost\ Centrality_{it} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt}$$

	(1) CAR (-20,+20)	(2) CAR (-10,+10)	(3) CAR (-20,+20)	(4) CAR (-10,+10)	(5) CAR (-20,+20)	(6) CAR (-10,+10)	(7) CAR (-20,+20)	(8) CAR (-10,+10)
Lost Degree Percentage Weighted	-0.034*** (-3.15)	-0.027*** (-3.60)			-0.035*** (-3.23)	-0.028*** (-3.68)		
Degree Percentage Weighted					0.020 (1.06)	0.014 (1.03)		
Lost Eigen-Vector Percentage Weighted			-0.039*** (-3.31)	-0.022*** (-2.65)			-0.039*** (-3.33)	-0.023** (-2.58)
Eigen Vector Percentage Weighted							0.029** (1.98)	0.014 (1.29)
Specific Purpose	-0.009 (-0.44)	-0.010 (-0.76)	-0.008 (-0.39)	-0.010 (-0.72)	-0.008 (-0.43)	-0.010 (-0.75)	-0.005 (-0.24)	-0.020 (-1.37)
No. of Past Engagements	-0.001 (-0.97)	-0.001 (-1.34)	-0.001 (-1.01)	-0.001 (-1.41)	-0.001 (-1.21)	-0.001 (-1.56)	-0.002** (-1.98)	-0.001 (-1.12)
Activist Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Engagements	937	939	937	939	937	939	937	939
R-Squared	0.249	0.254	0.250	0.248	0.250	0.255	0.254	0.268

Table A5: Placebo Test for the Effect of Network Position

The sample used in this test contains both the activist engagement sample and a pseudo activism sample that includes stocks that are owned by a sample of long-short equity hedge funds. Conditions that should be satisfied to add stocks-funds events to the pseudo sample are twofold. First, the hedge fund's holding of that stock should increase significantly in a period, and the change in ownership should be revealed to the public through 13F filings for the first time. Second, no other hedge funds should file schedule 13D or 13G in the same period. The sample starts in 1999 and ends in 2007. The main independent variables are Lost Degree centrality and Lost Eigen-vector centrality of the activist which show the percentage of the activists' network that is lost due to mutual fund manager turnovers. Activist fixed-effects, Industry fixed-effects and year fixed-effects are included in all specifications. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$CAR_{ijt} = \beta_1 Centrality\ Measure_{it} + \beta_2 Centrality\ Measure_{it} \times Placebo\ Dummy + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt}$$

	(1) CAR (-20,+20)	(2) CAR (-10,+10)	(3) CAR (-20,+20)	(4) CAR (-10,+10)
Lost Degree	-0.018**	-0.012		
	(-2.33)	(-1.53)		
Lost Degree × Placebo	0.013	0.012		
	(0.92)	(1.23)		
Lost Eigen-Vector			-0.008***	-0.005**
			(-2.75)	(-2.49)
Lost Eigen-Vector × Placebo			0.004	0.004
			(0.40)	(0.73)
No. of Past Engagements	-0.000	-0.000**	-0.000	-0.000**
	(-0.71)	(-1.99)	(-0.78)	(-2.05)
Activist Fixed-Effects	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes
Number of Engagements	1,264	1,269	1,264	1,269
R-Squared	0.049	0.055	0.049	0.054

Table A6: Connection Loss (Level) and Announcement Return

The dependent variables are cumulative abnormal returns around activism announcements. The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables is a dummy variable which captures the level of connection loss due to mutual fund manager turnovers. Activist fixed-effects, industry fixed-effects and year fixed-effects are included in the regressions. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$CAR_{ijt} = \beta_1 \text{Lost Centrality}_{it} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt}$$

	CAR (-20,+20)	CAR (-10,+10)	CAR (-20,+20)	CAR (-10,+10)	CAR (-20,+20)	CAR (-10,+10)	CAR (-20,+20)	CAR (-10,+10)
Lost Degree	-0.021**	-0.021***			-0.033***	-0.029***		
	(-2.18)	(-3.15)			(-3.11)	(-3.92)		
Degree					0.065***	0.043**		
					(2.68)	(2.52)		
Lost Eigen-Vector			-0.019*	-0.010			-0.025**	-0.014*
			(-1.88)	(-1.46)			(-2.44)	(-1.87)
Eigen Vector							0.050**	0.027*
							(2.45)	(1.86)
Specific	-0.009	-0.010	-0.009	-0.010	-0.008	-0.009	-0.007	-0.009
Purpose	(-0.46)	(-0.72)	(-0.44)	(-0.70)	(-0.40)	(-0.66)	(-0.38)	(-0.66)
No. of Past	-0.000	-0.000	-0.001	-0.001*	-0.000	-0.000	-0.002*	-0.001**
Engagements	(-0.46)	(-0.51)	(-1.48)	(-1.72)	(-0.20)	(-0.27)	(-1.91)	(-2.04)
Activist Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Engagements	937	939	937	939	937	939	937	939
R-Squared	0.244	0.251	0.242	0.243	0.251	0.257	0.248	0.247

Table A7: Connection Loss and Announcement Return - Controlling for the Connectivity Level

The dependent variables are cumulative abnormal returns around activism announcements. The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Lost Degree centrality and Lost Eigen-vector centrality of the activist which show the percentage of the activists' network that is lost due to mutual fund manager turnovers. The level of connectivity is included in all of the regressions as a control variable. Activist fixed-effects, industry fixed-effects and year fixed-effects are included in all specifications. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$CAR_{ijt} = \beta_1 Centrality\ Measure_{it} + \beta_2 Percentage\ of\ Lost\ Centrality_{it} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt}$$

	(1) CAR (-20,+20)	(2) CAR (-10,+10)	(3) CAR (-20,+20)	(4) CAR (-10,+10)	(5) CAR (-20,0)	(6) CAR (+1,+20)	(7) CAR (-20,0)	(8) CAR (+1,+20)
Lost Degree	-0.026***	-0.018***			-0.013**	-0.012*		
	(-2.92)	(-2.88)			(-2.36)	(-1.94)		
Degree	0.038*	0.018			0.025*	0.010		
	(1.72)	(1.16)			(1.76)	(0.61)		
Lost Eigen-Vector			-0.029***	-0.019**			-0.019***	-0.008
			(-2.67)	(-2.46)			(-2.79)	(-1.02)
Eigen Vector			0.042**	0.023*			0.027**	0.011
			(2.12)	(1.65)			(2.13)	(0.78)
Specific	-0.013	-0.013	-0.008	-0.009	-0.006	-0.015	-0.004	-0.013
Purpose	(-0.66)	(-0.91)	(-0.43)	(-0.69)	(-0.48)	(-1.08)	(-0.30)	(-0.94)
No. of Past	-0.001	-0.001	-0.001	-0.001*	-0.000	-0.000	-0.001	-0.000
Engagements	(-0.94)	(-1.36)	(-1.59)	(-1.93)	(-0.96)	(-0.51)	(-1.59)	(-0.80)
Activist Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Engagements	937	939	937	939	943	937	943	937
R-Squared	0.250	0.250	0.250	0.249	0.216	0.250	0.220	0.247

Table A8: Activists' Centrality and Announcement Return (Three Year Window)
The dependent variables are cumulative abnormal returns around activism announcements. The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Degree centrality, Eigen-vector centrality of the activist, Lost Degree due to manager turnovers in connected mutual funds and Lost Eigenvector. All of these variables are calculated based on investments that happen not later than three years before the engagement. Activist fixed-effects, industry fixed-effects and year fixed-effects are included in all specifications. In all regressions, I control for Target characteristics which are listed and defined in the variables definition table in the Appendix. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$CAR_{ijt} = \beta_1 Centrality\ Measure_{it} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt}$$

	CAR (-20,+20)	CAR (-10,+10)	CAR (-20,+20)	CAR (-10,+10)	CAR (-20,+20)	CAR (-10,+10)	CAR (-20,+20)	CAR (-10,+10)
Lost Degree	-0.028***	-0.022***			-0.028***	-0.023***		
	(-2.75)	(-3.15)			(-2.80)	(-3.21)		
Degree					0.033	0.028**		
					(1.63)	(1.98)		
Lost Eigen-Vector			-0.031***	-0.022***			-0.032***	-0.022***
			(-3.07)	(-3.03)			(-3.18)	(-2.73)
Eigen Vector							0.025	0.037***
							(1.57)	(3.24)
Specific	-0.009	-0.010	-0.008	-0.009	-0.009	-0.010	-0.008	-0.020
Purpose	(-0.47)	(-0.74)	(-0.41)	(-0.69)	(-0.45)	(-0.72)	(-0.43)	(-1.38)
No. of Past	-0.001	-0.001	-0.001	-0.001*	-0.000	-0.000	-0.001	-0.000
Engagements	(-0.90)	(-1.25)	(-1.29)	(-1.67)	(-0.39)	(-0.63)	(-1.29)	(-0.64)
Activist Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Engagements	937	939	937	939	937	939	937	939
R-Squared	0.243	0.250	0.244	0.249	0.245	0.254	0.247	0.278

Table A9: Activists' Centrality and Announcement Return (Two Percent Investors)
The dependent variables are cumulative abnormal returns around activism announcements. The sample consists of Hedge fund activism data from 1999 to 2007. The main independent variables are Degree centrality, Eigen-vector centrality of the activist, Lost Degree due to manager turnovers in connected mutual funds and Lost Eigenvector. All of these variables are calculated based on investments by investors that increase their ownership by more than two percent in activists' targets. Activist fixed-effects, industry fixed-effects and year fixed-effects are included in all specifications. In all regressions, I control for Target characteristics which are listed and defined in the variables definition table in the Appendix. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$CAR_{ijt} = \beta_1 Centrality\ Measure_{it} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt}$$

	CAR (-20,+20)	CAR (-10,+10)	CAR (-20,+20)	CAR (-10,+10)	CAR (-20,+20)	CAR (-10,+10)	CAR (-20,+20)	CAR (-10,+10)
Lost Degree	-0.028***	-0.023***			-0.029***	-0.023***		
	(-2.77)	(-3.16)			(-2.81)	(-3.18)		
Degree					0.023	0.009		
					(1.13)	(0.61)		
Lost Eigen-Vector			-0.028***	-0.018**			-0.029***	-0.019**
			(-2.72)	(-2.42)			(-2.77)	(-2.40)
Eigen Vector							0.030*	0.022*
							(1.68)	(1.71)
Specific	-0.008	-0.011	-0.006	-0.010	-0.007	-0.010	-0.005	-0.022
Purpose	(-0.41)	(-0.79)	(-0.32)	(-0.70)	(-0.38)	(-0.77)	(-0.26)	(-1.50)
No. of Past	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Engagements	(-0.83)	(-1.30)	(-1.11)	(-1.60)	(-0.98)	(-1.37)	(-1.47)	(-1.05)
Activist Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Engagements	937	939	937	939	937	939	937	939
R-Squared	0.246	0.252	0.246	0.248	0.248	0.252	0.249	0.271

Table A10: Activists' Centrality and Announcement Return (Controlling for Size)

The dependent variables are cumulative abnormal returns around activism announcements. The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Degree centrality, Eigen-vector centrality of the activist, Lost Degree due to manager turnovers in connected mutual funds and Lost Eigenvector. Activist fixed-effects, industry fixed-effects and year fixed-effects are included in all specifications. In all regressions, I control for Target characteristics which are listed and defined in the variables definition table in the Appendix and activist's size. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$CAR_{ijt} = \beta_1 Percentage\ of\ Lost\ Centrality_{it} + \beta_2 Size_{it} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt}$$

	(1) CAR (-20,+20)	(2) CAR (-10,+10)	(3) CAR (-20,+20)	(4) CAR (-10,+10)	(5) CAR (-20,+20)	(6) CAR (-10,+10)	(7) CAR (-20,+20)	(8) CAR (-10,+10)
Lost Degree	-0.040**	-0.029**			-0.046**	-0.033**		
	(-2.08)	(-2.15)			(-2.40)	(-2.38)		
Degree					0.052**	0.028		
					(2.11)	(1.59)		
Lost Eigen-Vector			-0.039**	-0.016			-0.042**	-0.014
			(-2.12)	(-1.19)			(-2.28)	(-1.04)
Eigen Vector							0.044**	0.035**
							(2.01)	(2.17)
Specific	-0.013	0.004	-0.012	0.005	-0.013	0.005	-0.011	-0.018
Purpose	(-0.51)	(0.23)	(-0.45)	(0.28)	(-0.49)	(0.25)	(-0.44)	(-0.93)
No. of Past	0.000	-0.002	-0.000	-0.002	-0.000	-0.002	-0.000	-0.001
Engagements	(0.10)	(-1.46)	(-0.05)	(-1.53)	(-0.03)	(-1.55)	(-0.19)	(-0.93)
Activist's Size	-0.003	0.005	-0.005	0.004	-0.002	0.006	-0.005	0.004
(Billion Dollar)	(-0.39)	(0.93)	(-0.67)	(0.70)	(-0.23)	(1.05)	(-0.68)	(0.77)
Activist Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Engagements	530	530	530	530	530	530	530	530
R-Squared	0.222	0.231	0.223	0.225	0.230	0.235	0.230	0.236

Table A11: Connection Loss and Information Revelation

The dependent variables are cumulative abnormal returns around activism announcements. The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Lost Degree centrality and Lost Eigen-vector centrality of the activist which show the percentage of the activists' network that is lost due to mutual fund manager turnovers. Prior Filing is a dummy variable equal to one if the market receives information about activists' ownership through quarterly findings prior to engagement announcements. Activist fixed-effects, Industry fixed-effects and year fixed-effects are included in all specifications. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\begin{aligned} CAR_{ijt} = &\beta_1 Percentage\ of\ Lost\ Centrality_{it} + \\ &\beta_2 Percentage\ of\ Lost\ Centrality_{it} \times Prior\ Filing_{ijt} \\ &+ Prior\ Filing_{ijt} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt} \end{aligned}$$

	(1) CAR (-20,+20)	(2) CAR (-10,+10)	(3) CAR (-20,+20)	(4) CAR (-10,+10)
Lost Degree	-0.050***	-0.039**		
	(-2.85)	(-2.27)		
Lost Degree × Prior Filing	0.012	0.022		
	(0.46)	(0.89)		
Lost Eigen-Vector			-0.030**	-0.019**
			(-2.34)	(-2.56)
Lost Eigen-Vector × Prior Filing			-0.003	0.010
			(-0.13)	(0.41)
Prior Filing	-0.007	0.006	-0.007	0.008
	(-0.32)	(0.35)	(-0.33)	(0.46)
Activist Fixed-Effects	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes
Number of Engagements	767	769	767	769
R-Squared	0.089	0.081	0.082	0.069

Table A12: Pre-announcement Activists' Centrality and Announcement Return
In this table, the sample of active investors in activist campaigns is constructed based on those institutional investors that increase their ownership prior to the announcements. The dependent variables are cumulative abnormal returns around activism announcements. The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Degree centrality and Eigen-vector centrality of the activist, both of which are defined in Section 3. Activist fixed effects, industry fixed effects and year fixed effects are included in all specifications. In all regressions, I control for Target characteristics which are listed and defined in the Variables Definition table in the Appendix. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$CAR_{ijt} = \beta_1 Centrality\ Measure_{it} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt}$$

	(1) CAR (-20,+20)	(2) CAR (-10,+10)	(3) CAR (-20,+20)	(4) CAR (-10,+10)
Degree	0.011	0.014*		
	(0.88)	(1.84)		
Eigen Vector			0.013	0.017**
			(1.05)	(2.06)
Specific	-0.012	-0.021	-0.012	-0.021
Purpose	(-0.55)	(-1.50)	(-0.55)	(-1.50)
No. of Past	-0.000	-0.000	-0.000	-0.001
Engagements	(-0.25)	(-0.62)	(-0.54)	(-1.12)
Activist Fixed-Effects	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes
Number of Engagements	937	939	937	939
R-Squared	0.063	0.064	0.064	0.066

Table A13: Pre-announcement Connection Loss and Announcement Return

In this table, the sample of active investors in activist campaigns is constructed based on those institutional investors that increase their ownership prior to the announcements. The dependent variables are cumulative abnormal returns around activism announcements. The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Lost Degree centrality and Lost Eigen-Vector centrality of the activist which show the percentage of the activists' network that is lost due to mutual fund manager turnovers. Activist fixed effects, industry fixed effects and year fixed effects are included in all specifications. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$CAR_{ijt} = \beta_1 Percentage\ of\ Lost\ Centrality_{it} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt}$$

	(1) CAR (-20,+20)	(2) CAR (-10,+10)	(3) CAR (-20,+20)	(4) CAR (-10,+10)	(5) CAR (-20,0)	(6) CAR (+1,+20)	(7) CAR (-20,0)	(8) CAR (+1,+20)
Lost Degree	-0.031***	-0.027**			-0.013**	-0.019**		
	(-3.16)	(-2.16)			(-2.00)	(-2.34)		
Lost Eigen-Vector			-0.026**	-0.020**			-0.008*	-0.016
			(-2.07)	(-2.20)			(-1.67)	(-1.29)
Specific	-0.010	-0.011	-0.009	-0.010	-0.005	-0.012	-0.005	-0.012
Purpose	(-0.47)	(-0.75)	(-0.42)	(-0.71)	(-0.48)	(-0.76)	(-0.45)	(-0.72)
No. of Past	-0.000	-0.000	-0.001	-0.001	-0.000	0.000	-0.001	-0.000
Engagements	(-0.46)	(-1.02)	(-0.88)	(-1.52)	(-1.15)	(0.15)	(-1.53)	(-0.17)
Activist Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Engagements	937	939	937	939	943	937	943	937
R-Squared	0.243	0.253	0.239	0.246	0.211	0.248	0.209	0.245

Table A14: Connection Loss Based on Turnover Ratio and Announcement Return

The dependent variables are cumulative abnormal returns around activism announcements. The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Lost Degree centrality and Lost Eigen-Vector centrality of the activist which show the percentage of the activists' network that is lost due to mutual fund manager turnovers. Connection loss is weighted based on the ratio of the turnover managers to the total number of fund managers involved in activist campaigns. Activist fixed effects, industry fixed effects and year fixed effects are included in all specifications. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$CAR_{ijt} = \beta_1 Percentage\ of\ Lost\ Centrality_{it} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt}$$

	(1) CAR (-20,+20)	(2) CAR (-10,+10)	(3) CAR (-20,+20)	(4) CAR (-10,+10)	(5) CAR (-20,0)	(6) CAR (+1,+20)	(7) CAR (-20,0)	(8) CAR (+1,+20)
Lost Degree	-0.036***	-0.028**			-0.015**	-0.018**		
	(-3.10)	(-2.47)			(-2.08)	(-1.99)		
Lost Eigen-Vector			-0.027**	-0.018***			-0.018**	-0.008
			(-2.37)	(-2.78)			(-2.16)	(-0.92)
Specific	-0.009	-0.010	-0.008	-0.010	-0.004	-0.013	-0.004	-0.013
Purpose	(-0.43)	(-0.71)	(-0.39)	(-0.69)	(-0.40)	(-0.78)	(-0.36)	(-0.77)
No. of Past	-0.001	-0.001	-0.001*	-0.001*	-0.000	-0.000	-0.001**	-0.000
Engagements	(-0.99)	(-1.31)	(-1.73)	(-1.93)	(-1.29)	(-0.53)	(-2.09)	(-0.86)
Activist Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Engagements	937	939	937	939	943	937	943	937
R-Squared	0.249	0.253	0.245	0.246	0.213	0.251	0.215	0.247

Table A15: Connection Loss Based on Filtered Turnovers and Announcement Return

The dependent variables are cumulative abnormal returns around activism announcements. The sample consists of hedge fund activism data from 1999 to 2007. The main independent variables are Lost Degree centrality and Lost Eigen-Vector centrality of the activist which show the percentage of the activists' network that is lost due to mutual fund manager turnovers. The sample of manager turnovers used in this table is filtered based on the managers' employment record after leaving the fund. Those managers who stayed in the same fund family or joined another fund as a portfolio manager are excluded from the turnover sample. Activist fixed effects, industry fixed effects and year fixed effects are included in all specifications. Standard errors are clustered at the activist level, and t statistics are shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$CAR_{ijt} = \beta_1 Percentage\ of\ Lost\ Centrality_{it} + \rho Z_t + \theta_i + \gamma_t + \lambda_{Ind_j} + \sigma_{ijt}$$

	(1) CAR (-20,+20)	(2) CAR (-10,+10)	(3) CAR (-20,+20)	(4) CAR (-10,+10)	(5) CAR (-20,0)	(6) CAR (+1,+20)	(7) CAR (-20,0)	(8) CAR (+1,+20)
Lost Degree	-0.030***	-0.022***			-0.015***	-0.015**		
	(-3.49)	(-3.61)			(-2.73)	(-2.51)		
Lost Eigen-Vector			-0.038***	-0.024***			-0.025***	-0.012
			(-3.62)	(-3.25)			(-3.75)	(-1.58)
Specific	-0.011	-0.013	-0.005	-0.009	-0.006	-0.013	-0.003	-0.011
Purpose	(-0.57)	(-0.95)	(-0.26)	(-0.65)	(-0.49)	(-0.96)	(-0.24)	(-0.77)
No. of Past	-0.001	-0.001	-0.001	-0.001	-0.000	-0.000	-0.001	-0.000
Engagements	(-0.75)	(-1.22)	(-1.20)	(-1.65)	(-0.94)	(-0.36)	(-1.35)	(-0.62)
Activist Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Engagements	937	939	937	939	943	937	943	937
R-Squared	0.246	0.253	0.247	0.250	0.215	0.249	0.222	0.246

Second Chapter: Peer Effects in Corporate Governance Practices: Evidence from Universal Demand Laws

1 Introduction

The impact of peers on firms' and managers' decisions has been the subject of a growing body of research in the economic and finance literatures. Peer practices and decisions can convey information or cause changes in the market environment that motivate firms and individuals to undertake similar actions. Theoretical studies present different frameworks in which social interactions may influence individual decisions (see, for example, Ellison and Fudenberg, 1995; DeMarzo et al., 2003). However, because the composition of peer groups and managerial decisions are endogenously determined, estimation of peer effects is a major challenge for empirical studies in this literature (Manski, 1993).

In this paper, we propose a novel method to identify peer effects in the area of corporate governance. We address two broad questions. First, do peer effects acting through board interlock networks influence firms' decisions to adopt particular governance provisions? Second, can we identify the incentives that underlie the propagation of governance practices across firms?

Board directors have an important role in passing and repealing governance provisions (Bebchuk, 2005; Ertimur et al., 2010). Davis (1991) and Davis and Greve (1997) show that firms tend to adopt poison pills and golden parachutes when other firms in their board interlock networks have adopted similar provisions. Bouwman (2011) finds a link between board interlocks and the convergence of governance practices such as board size, outside directors, CEO

duality, and compensation.[1] However, while peer effects may induce firms to adopt similar practices, Bouwman suggests that these empirical associations could alternatively arise from firms' decisions to select directors who are board members at firms with similar governance preferences. A clean identification strategy is required to establish a direct impact of peer groups on governance practice.

In order to estimate peer effects, the identification strategy needs to deal with the possibility of reverse causality and omitted variables that may confound the estimation. Bouwman (2011) notes that reverse causality will arise when board-interlock networks are endogenously formed by firms with similar governance philosophies. Moreover, omitted variable bias can result from an unobserved common shock that causes all firms in a board interlock network to adopt similar practices. To overcome these concerns, we require an exogenous instrument for the propensity of firms to adopt specific governance provisions that is orthogonal to both board interlock formations and common factors affecting all firms in a particular network.

Our proposed instrument is the staggered passage of universal demand (UD) laws that govern only firms incorporated in the affected states. In the period 1989-2005, 23 states passed UD laws requiring the board's approval for shareholders' derivative litigation against directors and officers. This staggered passage is a relevant instrumental variable: Appel (2014) shows that after the passage of these laws, firms increasingly adopted management- (as opposed to shareholder-) friendly governance provisions such as poison pills, supermajority voting requirements, and classified boards. We find that firms incorporated in other states, but linked to affected companies through a *pre-existing* interlock network, are also more likely to adopt such governance provisions, even when their states of incorporation have not themselves adopted

[1] Barzuza and Curtis (2014) provide a thorough review of studies on board interlocks and corporate governance.

UD laws.

Figure 1 illustrates our method. UD laws were passed in Georgia in 1989 and in Virginia in 1992. Consider two firms, Firm G in Georgia and Firm V in Virginia. Firms G and V are interlocked by two board members; one is Ms. X, who was elected to *both* firms before 1989. This pre-existing interlock, therefore, is presumably exogenous to the passage of the UD law in either state. However, once Ms. X is exposed to new governance policies made feasible or preferable by the passage of the UD law in Georgia, her newly gained experience may influence her incentives and inform her actions on the board of Firm V, on which she also serves. Crucially, because Ms. X was elected to both boards before UD laws were passed in either state, a chain of influence traceable to her would constitute evidence for a direct peer effect, not contaminated by group self-selection.

[Figure 1 near here]

In contrast, Mr. Y was elected to both firms between 1989 and 1992. It is possible that Mr. Y's selection by Firm G may have been related in part to Georgia's passage of the UD law. Therefore, to identify peer effects, we wish to measure only Ms. X's influence as the transmission mechanism. We therefore focus primarily on interlocks established before either state has a UD law in place. While we may use Mr. Y's inclusion on the board of Firm V as a control variable in explaining firms' governance choices, the key question will be how Ms. X's experience in one state affects the decisions of firms in the other states on which she serves.

The passage of UD laws addresses endogeneity concerns in several ways. First, UD laws are ratified by state legislators and are likely to be independent of board interlock networks. Moreover, for each pair of firms, we carefully select the interlocks that are already in place before the passage of a UD law affects either firm in the pair. As illustrated in Figure 1, this

procedure addresses the reverse causality concern in which board interlocks are established by firms with common governance practices. Second, to deal with unobserved common factors, we investigate peer effects in firm pairs where one firm is incorporated in a state with a UD law and the other is incorporated in a different state without a UD law. By isolating spillovers to the component that can be attributed to joint board members, we should eliminate the effects of common shocks that potentially could affect both firms. Finally, the remaining concern is that we will detect another effect (e.g., institutional investments) that is also triggered by the UD laws and flows through director networks, thus leading to correlation with the adoption of governance provisions at both firms. Although this mechanism is unlikely to generate our findings, we will include a range of firm-level control variables that are known to be correlated with the adoption of governance provisions to mitigate this concern.

Our analysis produces several findings. Our structural, 2SLS model shows that the projection of peer governance practices onto the prior UD law experience of a firm's interlocked directors is able to predict the firm's own governance practices. This projection is, by design, independent of potential self-selection effects, and thus provides evidence in support of causal peer effects. Consistent with this structural model, reduced form estimates confirm that firms with more board members who have experienced the passage of UD laws through their membership in other boards are significantly more likely to adopt several pro-management governance provisions; when the portion of these directors in the board increases from zero to 50 percent, firms' entrenchment index (E-Index; Bebchuk et al., 2009) increases on average by 0.22 points, a substantial impact in the context of mean and median values of 2. The effect of board interlocks is most significant for poison pills, classified boards, and limits-to-change bylaws. Increasing the portion of directors who have UD law experience by 50 percent raises firms' propensities to adopt a poison pill by 9.8 percent, a classified board by 6.9 percent, and

limits-to-change bylaws by 6.5 percent.

Next, we investigate the underlying mechanism for the spillover effects of governance practices among board-interlocked firms. One channel for spillover effects could come from the impact of UD laws on directors' incentives. Levit and Malenko (2015) demonstrate the possibility of multiple governance equilibria. In a "strong governance" equilibrium, value-maximizing and shareholder-friendly policies will enhance the value of directors' human capital. But in a "weak governance" equilibrium, that value will be enhanced through management-friendly policies. When states pass UD laws, they ease the way for management-friendly policies, and risk tilting the equilibrium toward the weak governance outcome. In this event, affected firms are more likely to hire directors who are known for maintaining good relationships with managers, and potential directors will signal their value by demonstrating an affinity for management-friendly governance provisions. Consistent with these dynamics, we find that after the passage of a UD law, firms in the affected states are increasingly prone to recruit directors who have experience in firms with management-friendly governance. Further, our results suggest that interlocked board members who sit on a board of a firm incorporated in a state that has passed a UD law are significant actors in the adoption of these governance provisions. Our empirical evidence for this transmission channel supports the Levit-Malenko model.

This channel is also consistent with our findings for the within-firm governance environment. We show that in the process of adopting governance provisions, directors seem to consider relative power across the board of directors, management, and shareholders as it affects their directorship outcomes. Firms with more powerful shareholders should be less influenced by the UD law experience of interlocked directors when making decisions affecting shareholders' ability to discipline entrenched management. Consistent with this expectation, we find

that the effect of board experience with UD law is significant for firms with low institutional ownership, but insignificant in the presence of high institutional ownership. Likewise, firms that employ governance provisions protecting management from takeover threats should exhibit stronger effects of UD law experience. Using CEO duality as a proxy for management power, we find that the UD law experience of interlocked directors affects only firms for which CEOs are also the board chairperson.

Our paper is related to two important strands of the corporate finance literature: the impact of peer effects on corporate decisions, and the labor market for directors. The literature on peer effects in corporations is relatively new and emerging. Recent studies have highlighted peer associations relating to firms' capital structure (Leary and Roberts, 2014), dividend payout (Popadak, 2014), and financial misconduct (Parsons et al., 2014). However, clean identification of a causal relationship is a major challenge for studies in this literature (Manski, 1993). As peer effects are not directly observable and are distinct from other industry and location factors, firm fixed-effects models cannot mitigate major concerns about reverse causality and omitted variables. The identification challenge is tackled in previous studies using statistical methods (Leary and Roberts, 2014; Popadak, 2014)[2] or by controlled experiments (Shue, 2013; Ahern et al., 2014). The advantage of employing state-level policy changes in our identification strategy is that it can be executed for large samples of firms and for several different corporate decisions. Our findings regarding the role of board experience and the interaction among the board, management, and shareholders provide further understanding of the underlying mechanism for peer effects.

Our paper also contributes to the literature investigating the role of reputation in the labor

[2]To identify peer effects, Leary and Roberts (2014) use idiosyncratic equity returns as an exogenous variation to peer firms' capital structure. Popadak (2014) identifies the effects using three separate methods: excess-variance, instrumental variable, and partial identification strategies.

market for directors. Directors presumably wish to build reputations regarding corporate governance so as to maximize their career prospects. But as the Levit and Malenko (2015) model shows, multiple equilibria are possible, and either management- or shareholder-friendly reputations may be optimal in different circumstances. One group of papers concludes that directors who are known as management-friendly are rewarded by the market through seating in more boards. For instance, Helland (2006) concludes that directors supporting weak governance actually enjoy a more successful career path. Using a sample of boardroom disputes, Marshall (2010) finds that directors who resign in dissent from one board are not rewarded by the market and suffer higher probabilities of losing other positions in the five years following their resignation. However, another group of papers finds that a reputation for being shareholder friendly is a valuable asset for directors. Fos et al. (2016) show that the closer directors of a board are to the end of their directorship term, the more likely they act in favor of shareholders. Facing shareholder class action lawsuits (Fich and Shivdasani, 2007) and proxy contests (Fos and Tsoutsoura, 2014) hurt a director's reputation and the likelihood of being selected for a directorship. Jiang et al. (2015) find that dissention from the board is rewarded in the form of outside directorships. Lel and Miller (2015) show that independent directors' reputational concern affects corporate governance practices. Our instrument allows us to demonstrate the potential impact of the legal framework on the equilibrium in the market for directors' services. Our results on the apparent shift toward a weak-governance equilibrium after passage of UD laws are new evidence on the importance of this determinant of corporate governance.

The rest of the paper is structured as follows. In Section 2, we discuss the institutional background of UD laws and their impact on corporations. In Section 3, we describe our data and empirical strategy. In Section 4, we develop our main hypotheses and in Section 5, we discuss the results of our tests. We conclude in Section 6.

2 Institutional Background

2.1. *Derivative Litigation*

The importance of shareholder legal rights for corporate governance is well established (Shleifer and Vishny, 1997). A shareholder derivative lawsuit can be brought by a shareholder or group of shareholders to reclaim value lost due to inappropriate management actions. As opposed to class action lawsuits in which the plaintiff is a subset of shareholders, the plaintiff in derivative lawsuits represents the interests of all shareholders. Therefore, derivative litigation can be a distinct legal mechanism to address agency problems in public firms (Ferris et al., 2007; Appel, 2014).

A shareholder group can sue management only when the corporation has a valid cause of action, but has refused to use it. This failure often emerges when the defendant in the suit is someone close to the company, for example, a director or a corporate officer. In such a case, the plaintiff will be the suing shareholder(s) and the corporation, and the defendant will be the management or directors. In the suit, the plaintiff shareholder(s) must prove that the management or directors have breached their fiduciary duties either by performing or failing to perform certain actions. A key feature of this type of lawsuit is that if it is successful, the proceeds go to the corporation, not to the shareholders who brought the suit. They benefit in part by the damages awarded to the firm, but more importantly, by effecting a change in policy.

Shareholder derivative litigation has become increasingly common in merger and acquisition transactions. For example, shareholders in Bank of America, led by two pension funds, the Louisiana Municipal Police Employees' Retirement System and the Hollywood Police Officers' Retirement System in Florida, sued the bank's directors and former CEO, Kenneth Lewis,

for misleading shareholders in the bank's acquisition of Merrill Lynch & Co. The shareholders claimed that the management and directors did not fully disclose that Merrill's losses totalled $15.84 billion in the fourth quarter of 2008 and that Merrill was still paying $3.6 billion in bonuses in that quarter. The lawsuit was resolved with a settlement of $62.5 million paid to the bank and a $20 million cash payout to shareholders for attorney's fees.

As discussed, payouts in derivative lawsuits go to the corporation and are typically covered by the liability insurance of the firms' directors. In some cases, however, the managers or directors will pay the settlement to a separate entity with their own money. For instance, a derivative lawsuit was brought against Lawrence J. Ellison, Oracle Corporation's chief executive officer, for insider trading in 2001. Mr. Ellison was accused of selling Oracle shares worth approximately $894 million before disclosing that Oracle would miss its earnings target. The stock dropped 45 percent after the news release. After four years of litigation, Mr. Ellison agreed to pay with his own money a settlement of $100 million and $22 million in legal fees. Since Mr. Ellison owned 24.5 percent of the firm, a direct payment to Oracle would benefit Mr. Ellison himself. Therefore, the settlement was paid in form of a charitable donation under Oracle's name to a charity chosen by the firm.

2.2. *Universal Demand Laws*

Although derivative litigation is intended to protect the interests of all shareholders, these lawsuits have been criticized for primarily serving the narrow interests of the suing shareholders. Some studies argue that derivative litigation is a means for the plaintiffs to extract settlement fees rather than to improve corporate governance. In response to this criticism, 23 states passed Universal Demand (UD) laws between 1989 and 2005 to regulate shareholder derivative lawsuits. Table A1 (see Appendix) reports a full list of states passing UD laws as

well as the years in which those laws became effective.

Before commencing a derivative action against a purported wrongdoing, UD laws require shareholders to first make a written demand that the board of directors take corrective measures, but the board may argue that such action would result in irreparable damage to the firm. The courts will dismiss a derivative action that is initiated before the board has responded to the demand unless the board fails to respond within a reasonable time.

As board directors are usually among the defendants in the derivative litigation, it is almost inevitable that the board will decide against the action. Hence, UD laws have become a major roadblock for shareholder derivative lawsuits in the affected states. Appel (2014) shows that after states pass UD laws, the average number of derivative lawsuits drops by a third.

3 Data and Methodology

The most important part of our identification strategy is the construction of the main explanatory variable, *UD Law Experience of Existing Board*. Our goal is to construct a variable that captures the propagation through overlapping director networks of the effects of UD laws on the governance of firms in other, unaffected states. There are three steps in constructing this variable: determining each firm's state of incorporation and headquarters, identifying board interlock networks, and constructing the firm-level variable, *UD Law Experience of Existing Board*.

3.1. *State of Incorporation and State of Headquarter*

To deal with the potential for unobserved common factors to affect governance decisions, we track decisions that derive from board interlocks across firms incorporated in different

states. Since the passage of UD laws in one state is unlikely to be correlated with an unobserved factor affecting firms in another state, we mitigate concern about omitted variables. To collect each firm's historical state of incorporation and state of corporate headquarters, we use a web crawler to extract the relevant data from SEC filings archived on the EDGAR server.[3] As EDGAR contains filings only since 1994, we must use 1994 data to fill in missing entries for previous years. We merge the data on state of incorporation and state of headquarters with Compustat using the Central Index Key (CIK); for firms with missing CIK, we match using IRS employer number. We then create a dummy variable equal to 1 for state-years in which UD laws were passed as well as for following years. There are no cases in our sample where a UD law was later reversed by a state that had passed one in earlier years.

3.2. *Board Interlocks*

We use BoardEx as the main data source for constructing board interlock networks. BoardEx started collecting data on top managers and directors holding positions in public firms in 1999. The data were backfilled for managers' and directors' past positions, educational background, and other activities. Earliest positions reported on BoardEx date back to the 1920s. The data contain a unique identification number for each director, allowing us to identify interlock directors who sit on the boards of different firms. The data also contain the start date and end date of each board position. This allows us to build a panel in which each observation is a firm-director-position-year.

3.3. *UD Law Experience*

Next, we merge the board interlock data with data about the state of incorporation and the

[3]Compustat reports only the current state of incorporation and current state of headquarters. This does not allow us to track firms that have been incorporated and reincorporated in different states during our sample period.

state of corporate headquarters. Finally, *UD Law Experience of Existing Board* is constructed as follows. First, we build an experience variable that shows whether each director has experienced a UD shock during the life of her directorship. We give an initial value of 1 to this variable if a person is a board member of a firm incorporated in a state that passes a UD law. In Figure 1, if Ms. X is a board member of firm G in Georgia in 1989 or thereafter, her experience variable for 1989 is set equal to one. However, we depreciate the experience variable using an exponential decay function that depends on the time gap between the year of each observation and the year in which the UD law was passed. In our example, assuming it is 1992 and Ms. X experienced the passage of the UD law in 1989 in Georgia, then using a depreciation rate of 0.15, the experience variable for Ms. X would equal $exp(-.15 * 3) = 0.64$.[4] Next, we sum the UD experience values that each director receives from directorships in different firms in each year and truncate his or her total value at a maximum value of one. Finally, we sum the experience value across the board members of each firm to build an experience variable at the firm level. Therefore, if there are two board members of Firm V in Virginia during 1992, and both of them experienced the passage of UD law in 1989 in Georgia, then using a depreciation rate of .15, the experience value of Firm V in this year is set equal to 0.64 + 0.64 = 1.28. Note that variable *UD Law Experience of Existing Board* only considers board interlocks that are in place before a UD law is passed in either firm's home state. This minimizes any concern that our results are driven by selection effects, i.e., firms' decisions to appoint directors who already have prior UD law experience.

The effects of board members who have already experienced UD law passage before joining

[4]The proper depreciation rate is largely a matter of guess-work. We choose 0.15 to give a half-life of 5 years. In the robustness check Table A4, we try a 0.25 depreciation rate and obtain similar results. In Table A5, we do not use a depreciation rate but instead employ a dummy variable set equal to 1 in the year when UD law is passed and the four subsequent years, and set equal to zero, otherwise. We obtain similar results in this specification as well.

the firm in question are captured in the variable *UD Law Experience of New Board Members*. This variable is constructed similarly to *UD Law Experience of Existing Board*. In Figure 1, the UD experience of Mr. Y would be measured by this variable. We normalize both of these variables, *UD Law Experience of Existing Board* and *UD Law Experience of New Board Members*, by the total number of board members.

3.4. *Corporate Governance*

The data source for firms' governance provisions is the Institutional Shareholder Services (ISS), formerly known as Riskmetrics, database. Since these data are available only every other year, we follow the standard practice in the literature of filling in missing years with data from the previous year. We focus on the E-Index and its six component provisions: poison pills, golden parachute, supermajority voting, classified boards, limits-to-change bylaws, and limits-to-change charter. We use ExecuComp to find CEO/Chairman duality for each firm-year.

Our sample begins in 1990. As in the rest of the literature (see for example, Knyazeva et al., 2013; Appel, 2014; Appel et al., 2016), the sample ends in 2006. This ending date is chosen because the format of the ISS governance database in the post-2006 period is inconsistent with that of the database in the period from 1990 to 2006.

3.5. *Control Variables*

Our main control variable is *Neighbor States UD Law Status* which equals the number of neighboring state(s) (based on the firm's headquarters) that have passed a UD law. We include this control variable to account for the possibility that the UD law status of neighboring states could influence both the formation of board interlocks and firms' governance practices (John and Kadyrzhanova, 2008). Other control variables for firms' characteristics are derived

from Compustat and CRSP. These include: total assets, leverage ratio, R&D expenditures, free cash flow, ROA, and firm age. The data appendix provides detail on the construction of these variables. We winsorize all accounting variables at the 2/98% levels.

Our final sample consists of 11,814 firm-years from 1990 to 2006. Table 1 reports the mean, median, standard deviation, top decile and bottom decile of each variable used in our analysis.

[Table 1 about here]

3.6. *Univariate Relations*

Before presenting formal hypotheses and tests, we present some univariate relations to motivate the analysis that follows. Table 2 shows some simple difference-in-difference statistics. In each case, the treatment group comprises firms whose directors are exposed to adoptions of UD laws because of their directorship positions in other firms in affected states. The control group comprises firms with similar asset size and initial E-index, but without directors exposed to such changes. We would expect the treatment group to exhibit no systematic differences in governance practices compared to the control group in the pre-UD five-year period, but a greater proclivity for management-friendly policies in the post-UD five-year period. Column (3) shows that the difference in the E-index between the two groups increases by 0.098 in the post-UD period, statistically significant at 5 percent. The difference in each individual component of the E-index also increases, but given the greater noise in the components, only one of the changes is statistically significant.

[Table 2 about here]

Figure 2 examines the time trend of the E-index following adoption of UD laws in states connected to the treatment group through a director network. The adoption of the law takes

place sometime in the first fiscal-event-year, which in Figure 1 is between time -1 and time 0. The evolution of the E-index of the treatment firms can be contrasted with that of several control groups. The various controls in the four panels of the figure are formed by alternative matching criteria, including firm size in year 0, the initial E-index in earlier years (either 3 or 5 years prior to the passage of the UD law), and/or industry SIC code. For all matching criteria, the figure shows that the difference in the E-index between the treatment and control group noticeably rises in years 1 and 2 before generally leveling out.

[Figure 2 about here]

It appears that the passage of UD laws in one state affects the governance of firms in unaffected states, at least when there is a connection through interlocked directors. However, more formal analysis is required to pin down the transmission mechanism.

4 Empirical Strategy and Results

The main hypothesis that we wish to test is whether (and how) existing director networks influence firms' propensities to mimic the governance provisions of connected firms. This is expressed in the following formal hypothesis.

- *Hypothesis 1: Firms that share directors with other firms that have experienced the passage of UD Laws are more likely to adopt similar management-friendly governance provisions.*

Our hypotheses will be tested in a regression framework in which adoption of various governance provisions, or the E-Index summarizing several of these provisions, is the dependent variable. While our hypotheses deal with the impact of UD laws on the propagation of governance practice, we will begin with a simple specification, similar to those already in the

literature, showing that board interlocks predict similarity of governance provisions. This regression simply allows us to compare the associations in our sample with those documented in previous studies (Davis, 1991; Davis and Greve, 1997; Bouwman, 2011). As in these studies, we construct a sample comprising all firms that themselves are not subject to UD laws, but which have a connection through interlocked directors to firms that are subject to such laws. We estimate the following regression model:

$$\text{Firm Governance}_{i,s,t+1} = \beta_1 \text{Peer Governance}_{i,t} + \theta_i + \gamma_{s,t} + \sigma_{i,s,t+1} \qquad (1)$$

where *Firm Governance*$_{i,s,t+1}$ in various specifications denotes either the E-Index or a specific governance provision of firm i in state of incorporation s, and year $t+1$. *Peer Governance*$_{i,t}$ is the average value of that particular governance provision in other firms at which interlocked directors have board seats. θ_i is the firm fixed-effect, and $\gamma_{s,t}$ is the state-year fixed effect.

Table 3 reports firm fixed-effects regressions, without instruments and with control variables included. The results are similar to those presented elsewhere in the literature. Each dependent variable is a governance practice, or the E-Index of each firm, and the explanatory variables are the average value of those same practices for firms with interlocked boards. The coefficients of E-Index, Classified Board, Bylaw Limits, and Charter Limits are positive and statistically significant at levels ranging from 1 percent to 10 percent, confirming a peer correlation in governance patterns across firms. While most of these results simply confirm prior findings, some differ. For example, we find that golden parachutes are less likely to spread through board interlock networks. One potential explanation for this difference is that our sample differs, including more firm-year observations. Moreover, as noted, these tests cannot distinguish between causal peer effects versus selection effects of directors across like-minded firms.

[Table 3 about here]

4.1. *UD Law-Based Estimates*

As discussed above, endogeneity issues call into question the results in Table 3. Using the staggered passage of universal demand (UD) laws as an exogenous instrument affecting adoption of governance provisions, we are able address these concerns and disentangle peer effects from other mechanisms that might explain these results. Appel (2014) documents that firms in UD law states are systematically more management friendly, as evidenced by their higher E-Indexes and higher propensities to adopt component provisions. We replicate the tests in Appel (2014) and report these results in Table A3 in the Appendix. The passage of UD laws appears correlated with management-friendly governance provisions and meets the relevance condition for the instrument in our analysis.

The structural equation we wish to estimate is essentially the same as Equation 1. However, to deal with the likely endogeneity of the *Peer Governance* variable, we re-estimate the equation in an IV-2SLS framework. In the first stage, we fit Peer Governance onto our instrumental variable, *UD Law Experience of Existing Board*, and then use the fitted value of this variable in the second-stage regression.

Therefore the first-stage regression is:

$$\begin{aligned}\text{Peer Governance}_{i,s,t} = \beta_1 \text{UD Law Experience of Existing Board}_{i,t} \\ + \theta_i + \gamma_{s,t} + \sigma_{i,s,t}\end{aligned} \tag{2}$$

In the second-stage regression, we replace Peer Governance with its fitted value from equation 2 and thus estimate equation 3:

$$\begin{aligned}\text{Firm Governance}_{i,s,t+1} = \beta_1 \text{Instrumented Peer Governance}_{i,s,t} \\ + \text{Firm Controls}_{i,s,t} + \theta_i + \gamma_{s,t} + \sigma_{i,s,t+1}\end{aligned} \tag{3}$$

where *Firm Controls*$_{i,s,t}$ is a vector of control variables for firm characteristics, θ_i is the firm fixed effect, and $\gamma_{s,t}$ is the state-year fixed effect. The 2SLS procedure ensures that the portion of peer governance that can be attributed to UD law experience, but not the portion due to self-selection, is allowed to influence governance in the treatment firms in the second-stage regression.

Table 4 reports estimates of the first-stage equation 2, which is the relation between interlocked directors' UD Law experience, *UD Law Experience of Existing Members*$_{i,t}$, and interlocked directors' governance experience at peer firms, *Peer Governance*$_{i,s,t}$. Interlocked directors' UD Law experience is strongly predictive of management-friendly governance provisions at peer firms. The results hold with the inclusion of firm fixed-effects, state-year fixed-effects, and firm controls. Specifically, when the portion of board directors with UD Law experience increases from zero to 50 percent, the average E-Index of peer firms increases by 0.62 points, and the propensities of passing Poison Pill, Classified Board, Golden Parachute, and Supermajority Voting provisions increase respectively by 19.4 percent, 13 percent, 21.9 percent, and 4.1 percent. Except for the Supermajority Voting model, the coefficients are statistically significant at the 1 percent level. Moreover, the Cragg-Donald Wald F statistic, which is 12.1 for Classified Board and greater than 20 for E-Index, Poison Pill, Golden Parachute, suggests that *UD Law Experience of Existing Board* is unlikely to be a weak instrument. Our first-stage results indicate that interlocked directors' UD Law experience is a strong predictor of interlocked directors' governance experience at peer firms.

[Table 4 about here]

Table 5 reports estimates of the second-stage regression, Equation 3. The coefficients on the instrumented peer firms' governance are positive and statistically significant at the 1 percent level in the models for E-Index, Poison Pill, and Classified Board. A one point increase in the instrumented E-Index of peer firms leads to an increase of 0.34 point in E-Index of the firm of interest. Poison Pill and Classified Board are the two component provisions that contribute the most to the detected effect. If the portion of peer firms which have poison pill and classified board provisions in place each increase from zero to 50 percent, the firm of interest is 28.3 percent more likely to adopt a poison pill provision and 25.6 percent more likely to adopt a classified board provision.

[Table 5 about here]

As an alternative to the 2SLS estimation, we also estimate a reduced form version of our model, in which we specify governance practice as a function of *UD Law Experience of Existing Board* as well as *UD Law Experience of New Board Members*. The specific regression equation is:

$$\begin{aligned}\text{Firm Governance}_{i,s,t+1} = \beta_1 \text{UD Law Experience of Existing Board}_{i,t} \\ + \beta_2 \text{UD Law Experience of New Board Members}_{i,t} + \theta_i + \gamma_{s,t} + \sigma_{i,s,t+1}\end{aligned} \tag{4}$$

where *Firm Governance*$_{i,j,k,s,t+1}$ is either the E-Index or each governance provision of firm i, in state of incorporation s, in year t+1. We emphasize that the sample period for this regression includes only years in which the second firm's state has not yet adopted a UD law. Therefore, a convergence of governance practices is presumably due only to the two firms' common,

interlocked directors, and cannot be a common response to similar changes in their regulatory environments. The coefficient of *UD Law Experience of Existing Board*$_{i,t}$, described in Section 2, is our main coefficient of interest. This coefficient tests the impact of those interlocked board members who were appointed before either state put in place a UD law.

UD Law Experience of New Board Members$_{i,t}$, described in Section 2, is a control for the impact of directors appointed after the passage of a UD law in one state, but its coefficient may also reflect endogenous peer-group formation effects. θ_i is the firm fixed-effect and $\gamma_{j,t}$ is the state-year fixed effect. To ensure that time-varying characteristics are not driving the results, we control for the number of neighboring states that have already passed a UD Law, as well as total assets, firm age, book leverage, R&D, free cash flow, and return on assets.

Table 6 reports the estimation for regression equation 4. The results reported in Panel A, which does not control for firm characteristics (but does include both firm- and state-year fixed effects), suggest that firms are more likely to adopt management-friendly governance provisions when other firms in their director networks have experienced the passage of UD laws. The coefficient of primary interest, *UD Law Experience of Existing Board*, is positive and statistically significant at the 1 percent level for the E-Index. It also is positive and statistically significant at the 1 percent level for Poison Pills, Classified Board, and Bylaw Limits. If the portion of the board directors who have UD Law experience through interlocked boards increases from zero to 50 percent, E-Index rises on average by 0.22 points, an increase equivalent to 11 percent of the mean and median values of the E-Index of 2. Regarding component governance provisions, increasing the portion of directors who have UD law experience by 50 percent raises a firm's propensity to adopt a poison pill by 9.8 percent, a classified board by 6.9 percent, and limits-to-change bylaws by 6.5 percent.

Panel B of the table reports results where other time-varying firm controls are also included. Specifically, we control for the number of neighboring states that already passed UD Law, total assets, firm age, book leverage, R&D expenditures, free cash flow, and return on assets. The economic and statistical significance of β_1, the coefficient on the *UD Law Experience of Existing Board Members* (i.e., members appointed to both boards before either state passed a UD law), are mostly unchanged. The coefficients on the experience of new board members (those appointed *after* the first state implemented a UD law) are generally larger than the coefficient on our instrumental variable. This highlights the potential importance of endogeneity biases. It is likely that the higher point estimates for the impact of the new directors reflects at least in part selection and matching biases. In Panel B, it is notable that the coefficient on *UD Law Experience of Existing Board* is negative in the model for Charter Limits. However, the impact is only significant at the 10 percent level and is economically small, reducing firms' propensity to adopt the provision by only 2.4 percent.

[Table 6 about here]

To conclude, our empirical strategy using UD Law as an instrument cleanly identifies governance practices of peer firms as an important factor explaining firms' decisions to adopt corporate governance provisions. Both the structural and reduced-form versions of the model tell a consistent story. In the next part of the paper, we provide further analysis to suggest that the reaction of interlocked directors to the change in the governance environment is a likely channel through which governance practices are propagated among interlocked firms.

4.2. *Director Reputation and the Market for Director Services*

Directors' desire to optimize their career outcomes could explain peer-effects in governance practices. In the Levit and Malenko (2015) model, regulatory changes may help deter-

mine whether the economy settles on a strong- or weak-governance equilibrium. In a weak-governance equilibrium, a management-friendly environment can engender higher *demand* by corporations for directors with management-friendly reputations. On the supply side, to maximize their directorship prospects, directors may choose to act in favor of shareholders [in a strong-governance equilibrium] or management [in a weak-governance equilibrium] to signal that they are of the director type preferred by the market. The passage of UD laws, which favors a weak-governance equilibrium, offers an opportunity to test this model. Therefore, we pose the following hypothesis:

- *Hypothesis 2: The demand for experienced management-friendly directors rises after states pass UD laws.*

To test this hypothesis, we estimate a regression equation in which each observation corresponds to a firm-year in which new directors are elected to a board. The dependent variable is the reputation of the appointees to each firm's board, as measured by the average value of the E-Index of the firms for which they have previously served (or by the average value of a specific component of the E-Index). The explanatory variable is an indicator variable for whether the firm's state of incorporation has ratified a UD law. We hypothesize that firms in UD-law states are more likely to hire directors from firms with more management-friendly governance practices.

The results in Table 7 confirm that passage of UD law favors the recruitment of management-friendly directors. In the model for the E-Index (column 1), the coefficient on the post-UD law dummy is positive and highly significant at better than the 1 percent level. Similarly, the coefficients on the Post-UD Law dummy are significant in explaining two of the components

of the E-Index.[5] The results indicate that the passage of a UD law makes directors who have served on management-friendly boards in other states more attractive to the firm. As such, it supports the Levit and Malenko (2015) proposition that regulatory changes can tilt the system toward a weak-governance equilibrium.

[Table 7 about here]

The results in Table 7 show that the demand for directors with management-friendly reputation increases when the legal environment encourages a "weak governance" equilibrium. In the following step, we examine the response of interlocked directors to the increased incentives they face to demonstrate a management-friendly orientation. Specifically, we test whether the passage of a UD law in a state where interlocked directors have board seats makes them more likely to adopt management-friendly governance provisions at firms in other states where UD laws are not in place.

- *Hypothesis 3: After one state has passed UD laws, interlocked directors who have board seats at firms in that state are more likely to adopt management-friendly governance provisions for their firms in other states where UD laws have not been passed.*

We use the following model to test this hypothesis, for each director-year (utilizing directors of firms in states that have passed UD laws):

$$\text{Firm Governance}_{j,i,s,t+1} = \beta_1 \text{Directors' UD Law Dummy}_{j,t} + \text{Firm Controls}_{i,s,t} + \omega_j + \gamma_{s,t} + \sigma_{j,i,s,t+1} \quad (5)$$

[5] In another specification, we replace state fixed-effects with firm fixed-effects. The coefficient on *Post UD Law* is significant at the 5 percent level and has similar economic magnitude. The results of this specification are reported in Table A7.

where j, i, s and t denote director j, firm i, state of incorporation s, and year t. The dependent variable is the E-Index or one of its six component governance provisions of a firm in a state that has not been affected by a change in the UD Laws (but which may have directors that have been affected via their other directorship). The independent variable, *Directors' UD Law Dummy*$_{j,t}$, is a dummy variable indicating whether the directors have board seats in a state where UD laws have been passed. ω_i is the firm fixed-effect, $\gamma_{s,t}$ is the state-year fixed effect. Our initial sample is all board position-years of interlocked directors. Then, we remove all the position-years after UD laws come into effect since we are only interested in firms in states where UD laws have not yet been passed.

Table 8 presents the results of this specification. The coefficient on *Directors' UD Law Dummy* is positively and statistically significant at the 1 percent and 5 percent levels for the E-Index and three component provisions. When an interlocked director experiences the passage of UD laws at one firm, the E-Index of other firms where he/she has a board seat increase by 0.09 point. The effect derives largely from the increased propensity to adopt poison pill, 3.7 percent, classified board, 3.6 percent, and limit-to-change bylaws, 0.7 percent.

[Table 8 about here]

In sum, the test results for Hypothesis 2 and Hypothesis 3 indicate that interlocked board members' incentive to maximize their career prospects is a plausible channel through which governance practices are propagated among boards of directors.

4.3. *Within-Firm Governance Environment*

We expand our analysis further by investigating the within-firm governance environment. If directors attempt to foster their career prospects as we hypothesize, the spillover effect in

provision adoption is likely to be affected by the relative power of shareholders and management. When shareholders are more powerful, the directors will presumably refrain from the adoption of governance provisions that serve to entrench management. Conversely, when managers are more powerful, the directors will be more inclined to adopt these provisions to maximize their career outcomes. We use both the level of institutional ownership and CEO duality as indicators of shareholders' power. Therefore, Hypotheses 4A and 4B are:

- *Hypothesis 4A: Firms with less institutional ownership that share director networks with firms that have experienced the passage of UD Laws are more likely to adopt similar governance provisions.*
- *Hypothesis 4B: Firms with CEO duality that share director networks with firms that have experienced the passage of UD Laws are more likely to adopt similar governance provisions.*

We expect the coefficient on *UD Law Experience of Existing Board* to be greater for firms with less powerful management. Therefore, we expect that β_1 in equation (4) for firms in the lowest quartile of institutional ownership will be positive and significant but will not necessarily significantly differ from zero for firms in the fourth quartile. Hypothesis 4B is similar, except that it uses CEO duality as a measure of management power. In firms with duality, the CEO has more power, and board members are more prone to act in his or her favor when considering governance provisions. Therefore, β_1 will be higher for firms with CEO duality: Interlocked members with UD backgrounds may use their experience with other firms to help management in the process of adopting these provisions.

Table 9 reports results for firms stratified by level of institutional ownership. For the firm in the lowest quartile of institutional ownership (Panel A), the coefficient on the UD experience of existing board members is positive and statistically significant at the 5 percent

level in explaining the E-Index and at the 1 percent to 10 percent levels in explaining three component provisions.[6] In contrast, the coefficient on UD Law experience is near zero and is not significantly different from zero for the high institutional ownership quartile. Similarly, none of the models for individual components of the E-Index generally produce statistically significant coefficients.

[Table 9 about here]

Table 10 reports tests of Hypothesis 4B where CEO duality is used as a measure of management power. For firms with CEO duality, the coefficient on UD Law experience is significant at 1 percent in explaining the E-Index (Panel A), but that coefficient is not significant for firms without CEO duality (Panel B). Turning to the component governance provisions of the E-Index for firms with CEO duality (Panel A), the Classified Board and Bylaw Limits models show positive and statistically significant coefficients on UD law experience at the 1 percent level, but for firms without CEO duality (Panel B), only the Bylaw Limits model has a positive and significant coefficient. These results are consistent with our expectation that more powerful shareholders would weaken the spillover effect of provision adoption through director networks while more powerful management would enhance the effect.

[Table 10 about here]

[6] Like Table 6, this table and the next use data only from before the adoption of a UD law in the second state. This ensures that any changes in governance cannot be attributed to the adoption of a UD law in that state. This regression design assures that the only transmission mechanism can be through the interlocked directors who have gained UD law experience in their other directorships.

5 Conclusion

While convergence of governance practices among firms linked through board interlocks has long been noted, the source of that convergence is extremely difficult to ascertain. It may be attributable to peer effects, whereby directors on one board are influenced by the experience and preferences of their peers. On the other hand, apparent convergence also would be observed simply through selection effects, in which firms with similar governance preferences recruit directors with similar preferences.

To tease out peer effects, one requires an instrument that is related to governance practice, but is unrelated to selection effects. The staggered adoption of Universal Demand laws across states provides just such an instrument. We find that after the passage of such laws, firms in affected states increasingly adopt management-friendly governance provisions. We also show that the management-friendly policies adopted by a firm governed by a UD law tend to be mimicked by other firms within that interlocked director network. Crucially, by restricting the sample to networks formed by appointments to boards of firm pairs prior to the adoption of a UD law by the state of either firm, we can be confident that this apparent propagation of policy cannot be due to selection effects.

One transmission mechanism seems to work through the market for director services. In a strong-governance equilibrium, directors will increase the value of their human capital by signaling a proclivity for shareholder-friendly governance. But in a weak-governance equilibrium, a management-friendly reputation will be optimal. Universal Demand laws, which make it harder to sue directors for dereliction of their duties toward shareholders, can tilt the equilibrium toward the weak-governance outcome. We find that after passage of such laws, firms are more likely to recruit directors currently serving on other management-friendly boards; inter-

locked directors are thus incentivized to signal that they are management-friendly. Moreover, directors' career considerations seem to respond to the balance of power among directors, management, and shareholders. Directors in firms with fewer strong shareholders are more prone to respond to UD laws with management-friendly governance provisions. Similarly, they are more inclined to adopt such provisions when the CEO is stronger.

We conclude that regulation can affect the nature of the equilibrium in the market for directors' services by changing the incentives faced by directors in dealing with conflicts of interest between managers and shareholders.

References

Ahern, K. R., Duchin, R., Shumway, T., 2014. Peer effects in risk aversion and trust. Review of Financial Studies p. hhu042.

Appel, I., 2014. Governance by litigation. Working Paper .

Appel, I. R., Gormley, T. A., Keim, D. B., 2016. Passive investors, not passive owners. Journal of Financial Economics 121, 111–141.

Barzuza, M., Curtis, Q., 2014. Board interlocks and corporate governance. Delaware Journal of Corporate Law 29.

Bebchuk, L., Cohen, A., Ferrell, A., 2009. What matters in corporate governance? Review of Financial Studies 22, 783–827.

Bebchuk, L. A., 2005. The case for increasing shareholder power. Harvard Law Review pp. 833–914.

Bouwman, C. H., 2011. Corporate governance propagation through qverlapping directors. Review of Financial Studies p. hhr034.

Davis, G. F., 1991. Agents without principles? the spread of the poison pill through the intercorporate network. Administrative Science Quarterly pp. 583–613.

Davis, G. F., Greve, H. R., 1997. Corporate elite networks and governance changes in the 1980s. American Journal of Sociology 103, 1–37.

DeMarzo, P. M., Vayanos, D., Zwiebel, J., 2003. Persuasion bias, social influence, and unidimensional opinions. The Quarterly Journal of Economics 118, 909–968.

Ellison, G., Fudenberg, D., 1995. Word-of-mouth communication and social learning. The Quarterly Journal of Economics pp. 93–125.

Ertimur, Y., Ferri, F., Stubben, S. R., 2010. Board of directors' responsiveness to shareholders: Evidence from shareholder proposals. Journal of Corporate Finance 16, 53–72.

Ferris, S. P., Jandik, T., Lawless, R. M., Makhija, A., 2007. Derivative lawsuits as a corporate governance mechanism: Empirical evidence on board changes surrounding filings. Journal of Financial and Quantitative Analysis 42, 143–165.

Fich, E. M., Shivdasani, A., 2007. Financial fraud, director reputation, and shareholder wealth. Journal of Financial Economics 86, 306–336.

Fos, V., Li, K., Tsoutsoura, M., 2016. Do director elections matter? Available at SSRN 2609815 .

Fos, V., Tsoutsoura, M., 2014. Shareholder democracy in play: Career consequences of proxy contests. Journal of Financial Economics 114, 316–340.

Helland, E., 2006. Reputational penalties and the merits of class-action securities litigation*. Journal of Law and Economics 49, 365–395.

Jiang, W., Wan, H., Zhao, S., 2015. Reputation concerns of independent directors: Evidence from individual director voting. Review of Financial Studies p. hhv125.

John, K., Kadyrzhanova, D., 2008. Relative governance. Working Paper .

Knyazeva, A., Knyazeva, D., Masulis, R. W., 2013. The supply of corporate directors and board independence. Review of Financial Studies 26, 1561–1605.

Leary, M. T., Roberts, M. R., 2014. Do peer firms affect corporate financial policy? The Journal of Finance 69, 139–178.

Lel, U., Miller, D. P., 2015. The market for director reputation around the world: Evidence from international shocks to reputation. Available at SSRN 2544152 .

Levit, D., Malenko, N., 2015. The labor market for directors and externalities in corporate governance. The Journal of Finance .

Manski, C. F., 1993. Identification of endogenous social effects: The reflection problem. The Review of Economic Studies 60, 531–542.

Marshall, C. D., 2010. Are dissenting directors rewarded? Available at SSRN 1668642 .

Parsons, C. A., Sulaeman, J., Titman, S., 2014. The geography of financial misconduct. Working Paper .

Popadak, J. A., 2014. Dividend payments as a response to peer influence. Working Paper .

Shleifer, A., Vishny, R. W., 1997. A survey of corporate governance. The journal of finance 52, 737–783.

Shue, K., 2013. Executive networks and firm policies: Evidence from the random assignment of mba peers. Review of Financial Studies 26, 1401–1442.

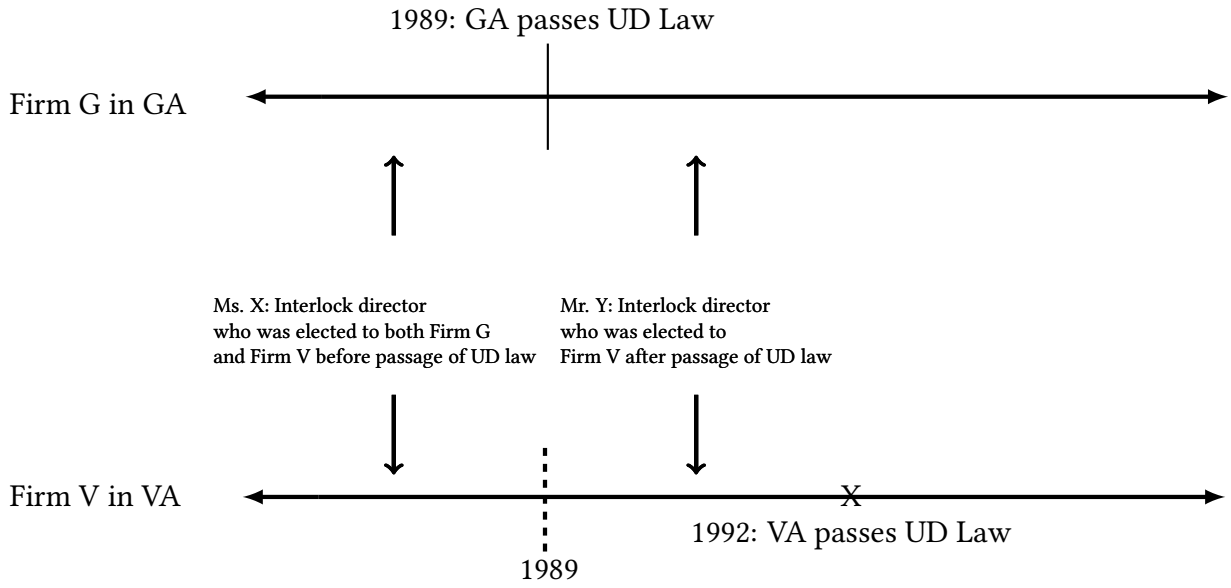
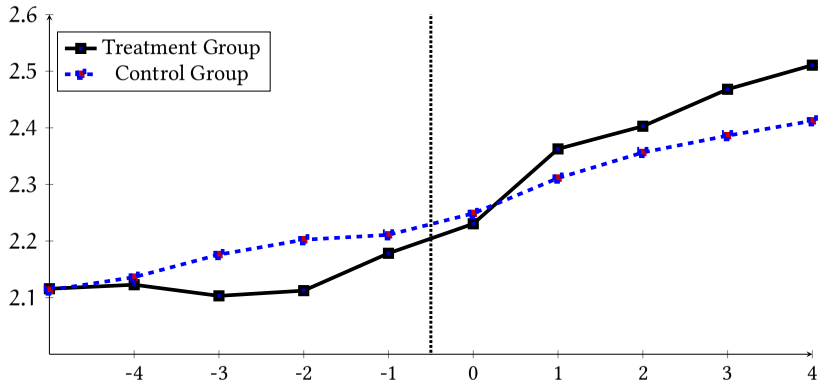
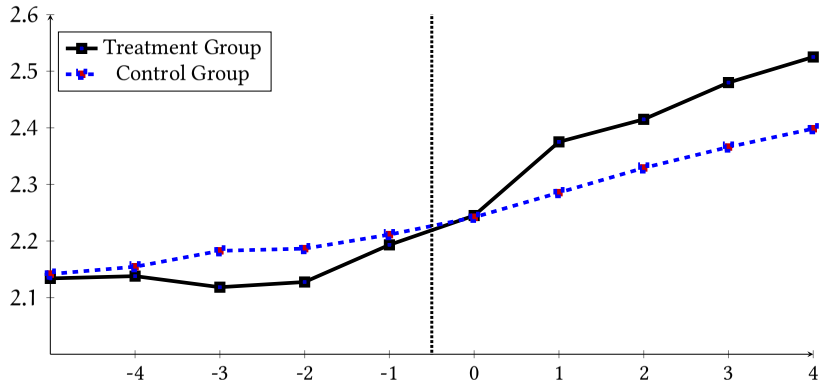


Figure 1: Hypothetical Timeline for Adoption of Universal Demand Laws

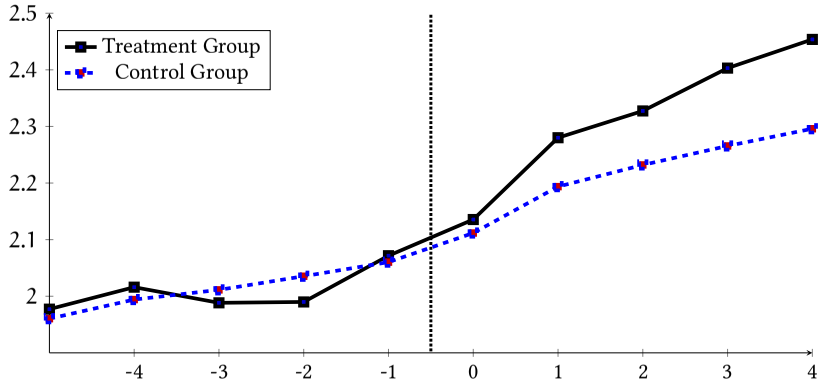
Time line showing hypothetical adoption of UD laws in two states and the appointment of board members of two firms in those states. Georgia adopts UD laws in 1989 and Virginia in 1992. Ms. X is appointed to both boards before the adoption of UD laws in either state. However, Mr. Y is appointed to both boards sometime between 1989 and 1992.



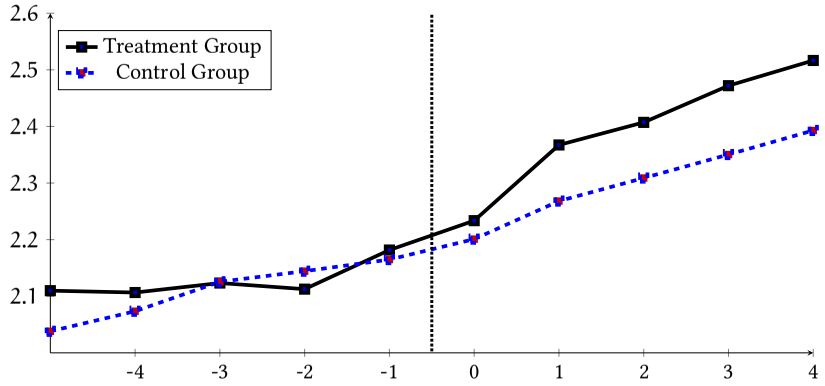
(a) Control sample is matched to treatment firms according to the size decile in year 0 (based on total assets) as well as the E-index in year -5.



(b) Control sample is matched to treatment firms according to the size quartile in year 0 (based on total assets) as well as the E-index in year -5.



(c) Control sample is matched to treatment firms according to the 2-digit SIC code in year 0 as well as the E-index in year -5.



(d) Control sample is matched to treatment firms according to the size decile in year 0 (based on total assets) as well as the E-index in year -3.

Figure 2: Evolution of E-index for firms linked to other firms that have experienced a change in UD laws compared to alternative control groups.

Table 1: Descriptive Statistics

	Mean	p10	p50	p90	S.D.	N
UD Law Experience of Existing Board	0.02	0.00	0.00	0.07	0.05	11,814
UD Law Experience of New Board Members	0.01	0.00	0.00	0.04	0.03	11,814
E-Index	2.07	0.00	2.00	4.00	1.31	11,814
Poison Pill	0.55	0.00	1.00	1.00	0.50	11,814
Classified Board	0.57	0.00	1.00	1.00	0.49	11,814
Golden Parachute	0.59	0.00	1.00	1.00	0.49	11,814
Supermajority	0.16	0.00	0.00	1.00	0.36	11,814
Limits to Amend Bylaws	0.18	0.00	0.00	1.00	0.38	11,814
Limits to Amend Charter	0.02	0.00	0.00	0.00	0.13	11,814
Neighbour States UD Law Status	1.54	0.00	1.00	3.00	1.21	11,814
Total Assets	7.22	5.47	7.07	9.29	1.45	11,814
Book Leverage	0.37	0.00	0.36	0.73	0.31	11,814
R&D to Assets	0.04	0.00	0.00	0.12	0.07	11,814
Free Cash Flow	0.21	0.02	0.18	0.43	0.21	11,814
Return on Assets	0.11	0.01	0.10	0.23	0.12	11,814
Firm Age	26.79	8.00	26.00	48.00	15.26	11,814
New Directors' Reputation						
E-Index Reputation	2.19	1.00	2.00	3.50	1.09	2,200
Poison Pill Reputation	0.58	0.00	0.67	1.00	0.42	2,200
Classified Board Reputation	0.59	0.00	0.67	1.00	0.42	2,200
Golden Parachute Reputation	0.66	0.00	1.00	1.00	0.41	2,200
Supermajority Voting Reputation	0.15	0.00	0.00	0.50	0.31	2,200
Charter Limits Reputation	0.02	0.00	0.00	0.00	0.12	2,200
Bylaw Limits Reputation	0.19	0.00	0.00	1.00	0.33	2,200

Details about variable contruction as in Appendix A2

Table 2: Univariate Analysis
In this table, we examine the effect of a change in board members' experience of passing Universal Demand laws in other states on governance practices in place. The sample consists of firm-year observations between 1995 and 2001. This sample includes firms that experience the change in this period, the treatment group, and firms that do not experience the change, the control group. The first two columns show the difference of governance provisions before the change in the experience of board members and after the change in the experience. The third column shows the difference between the differences before and after the change in experience, and the t-stat of the difference shown in the parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Pre-UD Experience	(2) Post-UD Experience	(3) Pre-Post Difference	
E-Index	0.264	0.386	0.098**	(2.151)
Poison Pill	0.067	0.078	0.002	(0.063)
Classified Board	0.093	0.101	0.002	(0.151)
Golden Parachute	0.013	0.088	0.073***	(2.755)
Supermajority Voting	0.012	0.031	0.013	(1.131)
Charter Limits	-0.003	0.006	0.008	(1.348)
Bylaw Limits	0.082	0.083	0.001	(0.082)

Table 3: Board Interlocks and Adoption of Governance Provisions
The dependent variables are E-Index and each of the six provisions contained in the index. Governance data are from ISS from 1990 to 2006. The main independent variable is average value of the governance practice of other firms at which interlocked directors have board seats. Firm fixed-effects and state of incorporation-year fixed-effects are included in all specifications. Standard errors are clustered at the state of incorporation-year level and shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\text{Firm Governance}_{ist} = \beta_1 \text{Peer Governance}_{it} + \theta_i + \gamma_{st} + \sigma_{ist}$$

	(1) E-Index	(2) Poison Pill	(3) Classified Board	(4) Golden Parachute	(5) Supermajority Voting	(6) Bylaw Limits	(7) Charter Limits
E-Index	0.023***						
	(0.006)						
Poison Pill		0.013					
		(0.010)					
Classified Board			0.019***				
			(0.005)				
Golden Parachute				0.012			
				(0.012)			
Supermajority Voting					-0.005		
					(0.008)		
Bylaw Limits						0.018**	
						(0.008)	
Charter Limits							0.014*
							(0.008)
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firm-Years	12,278	12,278	12,278	12,278	12,278	12,278	12,278
Adj. R-Square	0.861	0.747	0.917	0.681	0.886	0.885	0.846

Table 4: UD Law Experience and Governance Provision Adoption - IV-2SLS First Stage
The dependent variables are E-Index and each of the six provisions contained in the index. Governance data are from ISS from 1990 to 2006. Firm fixed-effects, state-year fixed-effects and firm characteristics are included in all specifications. Standard errors are clustered at the state of incorporation-year level and shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\text{Peer Governance}_{i,s,t} = \beta_1 \text{UD Law Experience of Existing Board}_{i,t} + \theta_i + \gamma_{s,t} + \sigma_{i,s,t}$$

Peer Firms:	(1) E-Index	(2) Poison Pill	(3) Classified Board	(4) Golden Parachute	(5) Supermajority Voting	(6) Bylaw Limits	(7) Charter Limits
UD Law Experience of Existing Board	1.238*** (0.247)	0.387*** (0.070)	0.260*** (0.051)	0.437*** (0.114)	0.082 (0.059)	0.084** (0.040)	-0.012 (0.032)
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firm-Years	10,540	10,540	10,540	10,540	10,540	10,540	10,540
Adj. R-Square	0.580	0.522	0.563	0.568	0.511	0.495	0.416
F-statistic	30.0	25.1	12.1	32.7	2.9	2.7	0.5

Table 5: UD Law Experience and Governance Provision Adoption - IV-2SLS Second Stage

The dependent variables are E-Index and each of the six provisions contained in the index. Governance data are from ISS from 1990 to 2006. Firm fixed-effects, state-year fixed-effects and firm characteristics are included in all specifications. Standard errors are clustered at the state of incorporation-year level and shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\text{Firm Governance}_{i,s,t+1} = \beta_1 \text{Instrumented Peer Governance}_{i,s,t} + \text{Firm Controls}_{i,s,t} + \theta_i + \gamma_{s,t} + \sigma_{i,s,t+1}$$

	(1) E-Index	(2) Poison Pill	(3) Classified Board	(4) Golden Parachute	(5) Supermajority Voting	(6) Bylaw Limits	(7) Charter Limits
Instrumented Peer E-Index	0.338***						
	(0.115)						
Instrumented Peer Poison Pill		0.486**					
		(0.212)					
Instrumented Peer Classified Board			0.512***				
			(0.186)				
Instrumented Peer Golden Parachute				0.001			
				(0.206)			
Instrumented Peer Supermajority					-0.049		
					(0.707)		
Instrumented Peer Bylaws Limits						1.483*	
						(0.837)	
Instrumented Peer Charter Limits							2.007
							(5.768)
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firm-Years	10,540	10,540	10,540	10,540	10,540	10,540	10,540
Adj. R-Square	0.832	0.688	0.860	0.691	0.884	0.468	-0.035

Table 6: UD Law Experience and Governance Provision Adoption - Reduced-Form Model
The dependent variables are E-Index and each of the six provisions contained in the index. Governance data are from ISS from 1990 to 2006. Firm fixed-effects, state-year fixed-effects and firm characteristics are included in all specifications. Standard errors are clustered at the state of incorporation-year level and shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\text{Firm Governance}_{ist} = \beta_1 \text{UD Law Experience of Existing Board}_{it} + \beta_2 \text{UD Law Experience of New Board Members}_{it} + \theta_i + \gamma_{st} + \sigma_{ist}$$

	Panel A: No Control Variables						
	E-Index	Poison Pill	Classified Board	Golden Parachute	Supermajority Voting	Bylaw Limits	Charter Limits
UD Law Experience of Existing Board	0.443***	0.196***	0.137***	0.006	-0.005	0.129***	-0.021
	(0.132)	(0.070)	(0.037)	(0.091)	(0.058)	(0.034)	(0.015)
UD Law Experience of New Board Members	0.813**	0.366**	0.183*	-0.161	0.269**	0.266***	-0.105***
	(0.344)	(0.164)	(0.109)	(0.181)	(0.118)	(0.084)	(0.032)
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firm-Years	10,459	10,563	10,563	10,563	10,563	10,563	10,563
Adj. R-Square	0.864	0.748	0.920	0.691	0.884	0.883	0.792
	Panel B: With Control Variables						
	E-Index	Poison Pill	Classified Board	Golden Parachute	Supermajority Voting	Bylaw Limits	Charter Limits
UD Law Experience of Existing Board	0.419***	0.188***	0.133***	0.000	-0.004	0.125***	-0.024*
	(0.132)	(0.071)	(0.037)	(0.090)	(0.058)	(0.034)	(0.014)
UD Law Experience of New Board Members	0.811**	0.352**	0.177	-0.149	0.264**	0.251***	-0.085***
	(0.342)	(0.166)	(0.109)	(0.182)	(0.117)	(0.088)	(0.029)
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firm-Years	10,540	10,540	10,540	10,540	10,540	10,540	10,540
Adj. R-Square	0.864	0.748	0.921	0.691	0.884	0.883	0.800

Table 7: UD Laws and Newly Elected Directors' Reputation in Governance

The dependent variables are the average of newly elected directors' reputation based on the E-Index and each of its component provisions at the other firms at which the director has served. *Post UD Law* is an indicator for whether the firms' state of incorporation has a UD law. The sample is the firm-years, from 1990 to 2006, when new directors are added to the boards. Standard errors are clustered at the state of incorporation-year level and shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\text{New Directors' Reputation}_{ist} = \beta_1 \text{Post UD Law}_{st} + \gamma_s + \sigma_{ist}$$

	(1) E-Index Reputation	(2) Poison Pill Reputation	(3) Classified Board Reputation	(4) Golden Parachute Reputation	(5) Supermajority Voting Reputation	(6) Bylaw Limits Reputation	(7) Charter Limits Reputation
Post UD Law	0.686***	0.103	0.191**	0.099	0.196***	0.006	0.090
	(0.208)	(0.076)	(0.079)	(0.093)	(0.065)	(0.016)	(0.055)
State Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	2,192	2,192	2,192	2,192	2,192	2,192	2,192
Adj. R-Square	0.027	-0.001	0.015	0.106	0.015	0.013	0.013

Table 8: Interlocked Directors and Weak Governance Environment

The dependent variables are E-Index and each of the six provisions contained in the index. Governance data are from ISS from 1990 to 2006. $\text{Directors' UD Law Dummy}$ is a dummy variable indicating whether the directors have board seats in a state where UD laws have been passed. The sample is all director-position-years, from 1990 to 2006, at firms incorporated in states where UD laws are not in place. Standard errors are clustered at the state of incorporation-year level and shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\text{Firm Governance}_{j,i,s,t+1} = \beta_1 \text{Directors' UD Law Dummy}_{j,t} + \text{Firm Controls}_{i,s,t} + \omega_j + \gamma_{s,t} + \sigma_{j,i,s,t+1}$$

	Panel A: No Control Variables						
	E-Index	Poison Pill	Classified Board	Golden Parachute	Supermajority Voting	Bylaw Limits	Charter Limits
Director's UD Law Dummy	0.085***	0.037***	0.036***	-0.003	0.008	0.007**	0.001
	(0.028)	(0.014)	(0.011)	(0.011)	(0.008)	(0.003)	(0.008)
Director Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	34,914	34,914	34,914	34,914	34,914	34,914	34,914
Adj. R-Square	0.547	0.475	0.560	0.490	0.511	0.488	0.515
	Panel B: With Control Variables						
	E-Index	Poison Pill	Classified Board	Golden Parachute	Supermajority Voting	Bylaw Limits	Charter Limits
Director's UD Law Dummy	0.087***	0.037***	0.037***	-0.003	0.009	0.007**	-0.000
	(0.027)	(0.014)	(0.011)	(0.011)	(0.008)	(0.003)	(0.008)
Director Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	34,841	34,841	34,841	34,841	34,841	34,841	34,841
Adj. R-Square	0.553	0.485	0.562	0.494	0.517	0.491	0.521

Table 9: UD Law Experience, Institutional Ownership, and Governance Provision Adoption

The table reports regression results for two different firm groups, one firm group which has institutional ownership in the first (lowest) quartile, and one firm group which has institutional ownership in the fourth (highest) quartile. The dependent variables are E-Index, poison pill, classifed board, and golden parachute. Governance data are from ISS from 1990 to 2006. Firm fixed-effects, state-year fixed-effects and firm characteristics are included in all specifications. Standard errors are clustered at the state of incorporation-year level and shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Panel A: Institutional Ownership - 1st Quartile						
	E-Index	Poison Pill	Classified Board	Golden Parachute	Supermajority Voting	Bylaw Limits	Charter Limits
UD Law Experience of Existing Board	0.801**	-0.121	0.222*	0.160	0.239**	0.308***	-0.006
	(0.382)	(0.092)	(0.132)	(0.154)	(0.097)	(0.082)	(0.012)
UD Law Experience of New Board Members	-2.563*	-1.266**	-0.401	-1.587***	0.501*	0.327	-0.137
	(1.317)	(0.569)	(0.409)	(0.608)	(0.260)	(0.292)	(0.130)
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firm-Years	1,718	1,718	1,718	1,718	1,718	1,718	1,718
Adj. R-Square	0.847	0.757	0.910	0.700	0.863	0.866	0.831
	Panel B: Institutional Ownership - 4th Quartile						
	E-Index	Poison Pill	Classified Board	Golden Parachute	Supermajority Voting	Bylaw Limits	Charter Limits
UD Law Experience of Existing Board	-0.177	0.282	-0.055	-0.232	-0.160	0.016	-0.027
	(0.273)	(0.195)	(0.075)	(0.189)	(0.179)	(0.106)	(0.042)
UD Law Experience of New Board Members	1.481**	0.266	0.218	0.357	0.560**	0.117	-0.037
	(0.600)	(0.434)	(0.258)	(0.424)	(0.256)	(0.168)	(0.031)
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firm-Years	2,545	2,545	2,545	2,545	2,545	2,545	2,545
Adj. R-Square	0.875	0.757	0.945	0.684	0.890	0.856	0.787

Table 10: UD Law Experience, CEO Duality, and Governance Provision Adoption

The table reports regression results for two different firm groups, one with institutional ownership in the first (lowest) quartile, and one with institutional ownership in the fourth (highest) quartile. The dependent variables are supermajority voting, limits to amend bylaws, and limits to amend charter. Governance data are from ISS from 1990 to 2006. Firm fixed-effects, state-year fixed-effects and firm characteristics are included in all specifications. Standard errors are clustered at the state of incorporation-year level and shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Panel A: CEO Duality						
	E-Index	Poison Pill	Classified Board	Golden Parachute	Supermajority Voting	Bylaw Limits	Charter Limits
UD Law Experience of Existing Board	0.624***	0.149	0.192***	0.108	-0.028	0.203***	-0.001
	(0.200)	(0.101)	(0.057)	(0.112)	(0.068)	(0.061)	(0.016)
UD Law Experience of New Board Members	1.888***	0.487**	0.296***	0.401*	0.428***	0.346***	-0.071*
	(0.474)	(0.198)	(0.086)	(0.227)	(0.148)	(0.110)	(0.042)
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firm-Years	5,412	5,412	5,412	5,412	5,412	5,412	5,412
Adj. R-Square	0.886	0.765	0.935	0.729	0.906	0.892	0.826
	Panel B: Non CEO Duality						
	E-Index	Poison Pill	Classified Board	Golden Parachute	Supermajority Voting	Bylaw Limits	Charter Limits
UD Law Experience of Existing Board	0.378	-0.283	0.137	0.186	0.089	0.323***	-0.074
	(0.435)	(0.259)	(0.158)	(0.253)	(0.255)	(0.114)	(0.065)
UD Law Experience of New Board Members	1.137	0.650	0.229	-0.440	0.380	0.465**	-0.148*
	(1.060)	(0.589)	(0.285)	(0.563)	(0.458)	(0.216)	(0.086)
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firm-Years	2,440	2,440	2,440	2,440	2,440	2,440	2,440
Adj. R-Square	0.877	0.786	0.933	0.720	0.898	0.905	0.798

Appendices

Table A1: Universal Demand Legislation
This table lists the states of incorporation with universal demand (UD) laws and the corresponding effective year and statute reference. The final column reports the number of firm-year observations in the sample. Source: Appel (2014)

Year	State	Citation
1989	GA	Ga. Code Ann. § 14-2-742
	MI	Mich. Comp. Laws Ann. § 450.1493a
1990	FL	Fla. Stat. Ann. § 607.07401
1991	WI	Wis. Stat. Ann. § 180.742
1992	MT	Mont. Code. Ann. § 35-1-543
	VA	Va. Code Ann § 13.1-672.1B
	UT	Utah Code. Ann. § 16-10a-740(3)
1993	NH	N.H. Rev. Stat. Ann. § 293-A:7.42
	MS	Miss. Code Ann. § 79-4-7.42
1995	NC	N.C. Gen. Stat. § 55-7-42
1996	AZ	Ariz. Rev. Stat. Ann. § 10-742
	NE	Neb. Rev. Stat. § 21-2072
1997	CT	Conn. Gen. Stat. Ann. § 33-722
	ME	Me. Rev. Stat. Ann. 13-C, § 753
	PA	Cuker v. Mikalauskas (547 Pa. 600, 692 A.2d 1042)
	TX	Tex. Bus. Org. Code. Ann. 607.07401
	WY	Wyo. Stat. § 17-16-742
1998	ID	Idaho Code § 30-1-742
2001	HI	Haw. Rev. Stat. § 414-173
2003	IA	Iowa Code Ann. § 490.742
2004	MA	Mass. Gen. Laws. Ann. Ch. 156D, § 7.42
2005	RI	R.I. Gen. Laws. § 7-1.2-710(C)
	SD	S.D. Codified Laws 47-1A-742

Table A2: Variable Description

Variable	Definition
UD Law Experience of Existing Board	Experience of board interlocks that are in place before a UD law is passed in either firm's home state
UD Law Experience of New Board Members	Experience of board interlocks who join the firm after a UD law is passed in either firm's home state
Neighbor States UD Law Status	A dummy variable that is equal to one if one of the neighbor states has passed UD law.
New Directors' Reputation	Average governance practices of the firms in which an interlock director has served as a board member in the five years prior to joining a new firm
Logarithm of Total Assets	Logarithm of lagged asset value in COMPUSTAT
Book Leverage	Book value of debt(long-term debt + current liabilities) divided by the sum of book value of debt and book value of equity
R&D to Assets	R&D expenses in COMPUSTAT divided by lagged asset value
Free Cash Flow	Operating activities net cash flow minus investing activities net cash flow divided by lagged asset value
Return on Assets	Earnings before interest and tax divided by lagged asset value

Table A3: UD Law and Governance Provision Adoption

The dependent variables are E-Index and each of the six provisions contained in the index. Governance data are from ISS from 1990 to 2006. Firm fixed-effects, state of headquarter-year fixed-effects and industry-year are included in all specifications. Standard errors are clustered at the state of incorporation-year level and shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\text{Firm Governance}_{ijkst} = \beta_1 \text{UDLaw}_{st} + \theta_i + \gamma_{jt} + \lambda_{kt} + \sigma_{ijkst}$$

	(1) E-Index	(2) Poison Pill	(3) Classified Board	(4) Golden Parachute	(5) Supermajority Voting	(6) Bylaw Limits	(7) Charter Limits
UD Law	0.142***	0.012	0.026**	0.051**	0.028**	0.006	0.020**
	(0.046)	(0.023)	(0.013)	(0.024)	(0.014)	(0.011)	(0.009)
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firm-Years	18,575	18,575	18,575	18,575	18,575	18,575	18,575
Adj. R-Square	0.879	0.784	0.923	0.711	0.890	0.882	0.836

Table A4: Robustness Check

This table reports the robustness check for our main results in Table 6. The rates of 0.25 is used to depreciate interlocked directors' UD law experience. In Panel B, interlocked directors' UD law experience is constructed as a dummy variable which equals to 1 for The dependent variables are E-Index and each of the six provisions contained in the index. Governance data are from ISS from 1990 to 2006. Firm fixed-effects, state-year fixed-effects and firm characteristics are included in all specifications. Standard errors are clustered at the state of incorporation-year level and shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\text{Firm Governance}_{ist} = \beta_1 \text{UD Law Experience of Existing Board}_{it} + \beta_2 \text{UD Law Experience of New Board Members}_{it} + \theta_i + \gamma_{st} + \sigma_{ist}$$

	(1) E-Index	(2) Poison Pill	(3) Classified Board	(4) Golden Parachute	(5) Supermajority Voting	(6) Bylaw Limits	(7) Charter Limits
UD Law Experience of Existing Board	0.408***	0.158*	0.131***	0.024	-0.029	0.151***	-0.027*
	(0.141)	(0.082)	(0.039)	(0.095)	(0.067)	(0.035)	(0.015)
UD Law Experience of New Board Members	1.187***	0.425*	0.196	0.040	0.345***	0.264***	-0.083***
	(0.409)	(0.237)	(0.140)	(0.234)	(0.127)	(0.091)	(0.031)
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firm-Years	10,540	10,540	10,540	10,540	10,540	10,540	10,540
Adj. R-Square	0.864	0.748	0.921	0.691	0.884	0.883	0.800

Table A5: Robustness Check (cont)

This table reports the robustness check for our main results in Table 6. Interlocked directors' UD law experience is constructed as a dummy variable which equals to 1 in the year when UD law is passed and four subsequent years, and equals to zero, otherwise. The dependent variables are E-Index and each of the six provisions contained in the index. Governance data are from ISS from 1990 to 2006. Firm fixed-effects, state-year fixed-effects and firm characteristics are included in all specifications. Standard errors are clustered at the state of incorporation-year level and shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\text{Firm Governance}_{ist} = \beta_1 \text{UD Law Experience of Existing Board}_{it} + \beta_2 \text{UD Law Experience of New Board Members}_{it} + \theta_i + \gamma_{st} + \sigma_{ist}$$

	(1) E-Index	(2) Poison Pill	(3) Classified Board	(4) Golden Parachute	(5) Supermajority Voting	(6) Bylaw Limits	(7) Charter Limits
UD Law Experience of Existing Board	0.418***	0.169***	0.114***	-0.040	0.108***	0.091***	-0.024**
	(0.120)	(0.061)	(0.029)	(0.075)	(0.041)	(0.026)	(0.012)
UD Law Experience of New Board Members	0.122	0.168**	0.014	-0.146	0.032	0.113**	-0.059***
	(0.186)	(0.077)	(0.057)	(0.103)	(0.065)	(0.051)	(0.015)
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firm-Years	10,540	10,540	10,540	10,540	10,540	10,540	10,540
Adj. R-Square	0.864	0.748	0.921	0.691	0.884	0.883	0.800

Table A6: Robustness Check (cont)

The dependent variables are E-Index and each of the six provisions contained in the index. Governance data are from ISS from 1990 to 2006. Firm fixed-effects, state-year fixed-effects and firm characteristics are included in all specifications. Standard errors are clustered at the state of incorporation-year level and shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\text{Firm Governance}_{ist} = \beta_1 \text{UD Law Experience of Existing Board}_{it} + \theta_i + \gamma_{st} + \sigma_{ist}$$

	(1) E-Index	(2) Poison Pill	(3) Classified Board	(4) Golden Parachute	(5) Supermajority Voting	(6) Bylaw Limits	(7) Charter Limits
UD Law Experience of Existing Board	0.425***	0.188***	0.133***	0.010	-0.011	0.123***	-0.019
	(0.131)	(0.070)	(0.037)	(0.091)	(0.060)	(0.033)	(0.015)
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Firm-Years	10,459	10,563	10,563	10,563	10,563	10,563	10,563
Adj. R-Square	0.864	0.748	0.920	0.691	0.884	0.883	0.792

Table A7: UD Laws and Newly Elected Directors' Reputation in Governance

The dependent variables are the average of newly elected directors' reputation based on the E-Index and each of its component provisions at the other firms at which the director has served. *Post UD Law* is an indicator for whether the firms' state of incorporation has a UD law. The sample is the firm-years, from 1990 to 2006, when new directors are added to the boards. Standard errors are clustered at the state of incorporation-year level and shown in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

$$\text{New Directors' Reputation}_{ist} = \beta_1 \text{Post UD Law}_{st} + \gamma_s + \sigma_{ist}$$

	(1) E-Index Reputation	(2) Poison Pill Reputation	(3) Classified Board Reputation	(4) Golden Parachute Reputation	(5) Supermajority Voting Reputation	(6) Bylaw Limits Reputation	(7) Charter Limits Reputation
Post UD Law	0.686**	0.156	0.207*	0.142	0.151	0.041	-0.012
	(0.344)	(0.113)	(0.112)	(0.142)	(0.107)	(0.030)	(0.108)
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	1,885	1,885	1,885	1,885	1,885	1,885	1,885
Adj. R-Square	0.089	0.064	0.031	0.126	0.031	-0.029	0.072

Third Chapter: Do Hedge Fund Activists Exit Silently? Evidence from Short Selling Activities

1 Introduction

Hedge funds use equity derivatives, short sale, and other capital market developments to decouple voting rights from economic ownership, often without public disclosure (Hu and Black 2006, 2007). Short selling is a powerful instrument for hedge funds to make a profit out of arbitrage opportunities. As an example, hedge funds can simultaneously short the acquirer's stock and long target's shares (Dai et al. 2011). They can also short borrower's stock before syndicated loan announcements or amendment announcements (Massoud et al. 2011). Since there is significant information asymmetry between activists and other shareholders, I test the hypothesis that hedge fund activists use short sale to partially exit from their position without letting market know about their decision.

Although shareholder activism has long been studied in the finance literature, hedge funds' activism recently emerged as a central interest of research in this literature. As Figure 1 shows, the number of engagements, measured by the number of 13D filings, by hedge fund activists increased over time, and if it was not because of recent financial crisis, we would observe greater number after 2008. In their seminal work, Brav and his coauthors (2008) investigate the effect and role of hedge funds in successful engagements. Their paper and other studies show that market reacts positively to 13D announcements by hedge funds and they improve their targets' performance through CEO turnover (Del Guercio et al. 2008 and Brav et al. 2008), opposing a merger (Klein and Zur 2009), divesting assets (Clifford 2008), restructuring capital (Klein and Zur 2009, Zur 2007), and increasing opacity (Kang, Ozik and Sadka 2015). To make these changes in target firms, hedge funds employ different tactics such as selling their shares (Bharath et al. 2013, Edmans et al. 2013), negotiating

with CEO and board members (Brav et al. 2008), and confronting the target's management (Del Guercio et al. 2008, Klein and Zur 2009). While prior studies provide increasing understanding of activists' intervention strategies and different tactics to implement these strategies, much less is known about exiting strategies of hedge fund activists. This paper begins to fill this gap in the literature by examining possible hedge funds' short selling activities before their exit announcements. Short selling the target's stock by an activist could happen for the reasons if she feels that market would react negatively to the exit announcement or she thinks that front runners increase her cost of exiting.

[Figure 1 about here]

The current disclosure requirements for block holders make short selling an attractive option for hedge funds to exit out of their positions. The Securities and Exchange Act of 1934 requires 13D (13G) schedule to be filed within 10 days if any institutional or individual investor reaches 5 percent threshold of the public company's shares and has (has not) plans to influence the target firm. Schedule 13D requires disclosure of all filers' transactions in the company's stock during the past sixty days or since the most recent filing of Schedule 13D, whichever is less, and accordingly would include a description of the acquisitions and dispositions during the 10-day period between the event that triggered the filing requirement and the filing itself. However, the rule on short sale disclosure is not as clear. While complete disclosure of short selling positions has been called upon (Hu and Black 2006, 2007), there is currently no law or regulation mandating the disclosure of short positions (Wachtell Lipton 2008). Therefore, hedge funds can sell off all of their positions or part of it in their targets, without public disclosure.

In this paper, first I compare the average short interest in the final two months before exit announcement to the average in former four months, and find that the pattern of jump in the targets' short interest before hedge funds' exit announcements is more common among

firms that are targeted by a small group of activists compared to other activists targets. Second, I find that both the probability of observing a jump and the magnitude of a jump in short interest is significantly correlated with the hedge funds' activism experience[1]. Third, the motivation for this silent exiting strategy is more likely hedge funds' desire to lock their profits and exit safely as opposed to hedge funds' ability to predict announcement returns. My results are most in line with the hypothesis that activists use short sale to sell off their positions on the quiet.

There might, however be several alternative explanations for my findings. A spike in short interest could be explained by other factors such as reverse causality, simultaneity and information leakage. Reverse causality expresses that hedge funds start exiting their position when they observe abnormal short sale activities in the market. Next alternative explanation, simultaneity, reasons that something else, such as negative news, is causing the correlation between short sale jumps and exit announcements. Last alternative, information leakage, relates the jump in short interest to trading of other hedge funds that have private information about exit announcements by activists. If simultaneity or reverse causality was the case, we would observe downward price movements before or around the same time as activists exit from their position. Therefore,I rule out the reverse causality and simultaneity explanations by controlling for holding returns in different time windows before exit announcement. After controlling for holding returns in different windows before exit announcement, all my results still hold, indicating that reverse causality and simultaneity are not significant concerns in my analysis. To negate the information leakage explanation, I investigate the distribution of the exit announcement return. The univariate analysis of the return around exit announcement indicates that the exit return distribution in the

[1]To measure funds' characteristics, I borrow three variables from Krishnan et al. (2015) and Boyson et al (2015): experience, size of previous investments, average return around previous 13D announcements. Results in these papers imply that mentioned variables explain the positive return around 13D announcements. I add another variable, the average holding return of previous engagements, which explains positive market reaction to 13D announcements to the set of funds' characteristics.

sample is asymmetric (skewed to the right) but symmetric (slightly skewed to the right) in a subsample consisting of engagements in which short interests increase. Since arbitrageur funds that could be the short sellers and have private information from hedge fund activists seek events (exit announcements) in which expected return is negative and short interest shocks reappear when the firm is targeted by a hedge fund in a small subgroup of activists, it is less likely that information leakage explains the spikes in short interest.

This paper contributes to three strands of literature. To the best of my knowledge, this is the first paper introducing short selling by hedge fund activists as a possible exiting strategy. Focusing on the end part of hedge fund activism engagements, exiting, it completes the general strand of hedge fund activism literature that looks at hedge fund activism from different aspects, in particular the effect of engagements on targets' governance. Brav et al. (2008) is the first paper that scrutinizes this effect and pioneers in hedge fund activism literature[2]. Brav et al. (2008) and other following papers (Mayer, and Rossi (2008), Clifford (2008), Greenwood and Schor (2009), Klein and Zur (2009), Brav et al. (2010), Becht et al.(2011), Brav et al. (2013), Bebchuk et al. (2013), and Gantchev (2013)) in this field show that the market reacts positively to hedge funds' activism engagement announcements. They try to describe how hedge funds make changes in their targets that lead to a rise in firm value and operating performance. It is also shown that target prices decline upon the exit of an activist only after it has been unsuccessful (Brav et al. 2008) or upon the exit announcements by opaque hedge funds (Kang, Ozik and Sadka 2015). Nevertheless, besides categorizing engagements in groups based on the form of exiting and examining the market reaction to exit announcements, none of them have tested processes by which hedge fund activists offset their position. Testing one of the possible exiting strategies, silent exiting, in hedge fund activism, this paper is the first one that looks at offsetting strategies that are employed by hedge funds to exit from their position in their targets.

[2]See also Partnoy and Thomas (2006) and Kahan and Rock (2007).

Second, this paper is related to prior literature on financial regulations, in particular regulations on reporting by hedge funds. Correcting regulations regarding short sale is a major concern in the literature, and some of the papers in prior literature provide empirical evidence for this concern. Anderson et al. 2012 implies that hedge funds make profit out of the family firms' private information that has become available to them. Massoud et al. 2011 states a similar conjecture about misusing private information by hedge fund participants in syndicated loan market. In addition, Martin and Partnoy (2005) argues that one share/one vote could be suboptimal because the economic ownership can be decoupled from voting rights via trading in derivatives and short selling. Pointing out the same fact, Hu and Black (2006, 2007) proposes new regulatory regimes for reporting in financial markets, which would solve asymmetric information problems in the hedge fund activism. In this paper, I provide evidence that activist funds short sell to escape from financial regulations that make them reveal their exiting from their position in their targets. My results help justifying the regulatory change, suggested in Hu and Black (2006), in reporting short sale positions. Finally, it contributes to the literature on voice vs. exit (Admati and Pfleiderer (2009), Edmans and Manso (2011), Gopalan (2005)), showing that institutions can exit from their position with lower cost. Lower cost of exit makes it a more powerful tool for changing targets' governance.

The remainder of the paper is organized as follows. I describe the data collection process and sample description in section 2. I test related hypotheses empirically in sections 3 and express the possible extensions to this paper in section 4. Finally, section 5 concludes.

2 Data Construction and Summary Statistics

As there is no universal database for hedge fund activism, the hand collection of this sample is necessary. I use 13D filings filed by hedge fund activists from 1994 to 2011. My

sample is an extended version of the sample used in Brav et al. 2008. After cleaning the sample, I extract more information from 13D, 13D/A, 13F filings.

I use 13D filings to complete my database with the size of ownership. SEC requires active (passive) investors to file 13D (13G) in 10 (45) days within 10 days after their position exceeds a threshold of 5 percent. Each of the 13D co-filers should declare their position's size in a separate section. I use this requirement and collect information on the ownership of the funds in my sample and the aggregate ownership.

Another variable which is crucial for my analysis is the exit date. In the literature, papers use different methods to approximate hedge funds' exit date from SEC filings. The most common way is to use quarterly 13F filings to identify changes in ownership (Brav et al. 2008 and Kang, Ozik and Sadka 2015). I however, use a more accurate method to identify exit date through 13D amendments which is reported within 10 days of 1% change in filers' holdings. Therefore, it is possible to track the trend of activists' holdings in their targets and find the time that they sell off their shares. Although I use both ways to have the exit date for bigger portion of my sample, my prior for calculation is using 13D amendments because not only I can calculate the exit date more accurately but also I can keep track of the positions belong to the funds in my sample. I call a day exit date when funds' position fall below 5 percent or become half of their initial position. To calculate exit date from 13F filings, I rely on the same procedure used in Brav et al. 2008.

I used four characteristics of activist funds to analyze their behavior in engagements: average holding returns(cumulative abnormal returns between ten days before 13D announcements and five days before exit announcements), average 13D announcement returns (cumulative abnormal returns between ten days before and five days after 13D announcements), average investment size, and experience. Two return based variables, average holding return and average 13D announcement return, are calculated based on market reaction to hedge

funds' performances and engagements in their previous targets. The other two, average investment size and experience, come from their decisions on investment size and the frequency of their previous engagements. Following Zur (2007) argument and to make these measures more meaningful, I exclude the first three investments. After these screens, I have 1692 engagements in my sample which belong to 132 hedge fund activists. As panel A in Table II shows, I have exit date for 1496 observation in the sample, and 863 of them are calculated based on 13D/A.

Finally, I match my sample with CRSP database and Quarterly Compustat database to obtain stock returns and financial data. After these matchings, I complete my sample with Monthly Supplemental Short Interest database in Compustat.

Table 1 reports definitions of all control variables used in my analyses. To make sure that results are not the consequences of using improper proxies for control variables, I rely on Brav et al. proxies.

Table 2 describes my sample. Panel A provides detailed information on the number of observations and hedge funds in my sample. Panel B in Table 2 displays the distribution by year, and Panel C displays it by industry. Firms in my sample span all 12 industries in Fama-French classification. In panel D, I show the distribution of hedge funds in the sample by their experience, the number of their past 13D engagements.

Panel E reports the summary statistics of control variables (targets' characteristics) I used in my regressions. Although the period associated with my sample is different from that in Brav et al. (2008), most of the variables' mean and median are similar to the ones in their paper. Consistent with prior literature, hedge funds target firms with positive earnings, i.e., the mean EBITDA/Assets is 2%, and positive levels of cash and debt, i.e. its mean (Cash+Short-term-Investment)/Assets is 21% and (Total Debt)/Assets is 32%. Panel F summarizes investment characteristics such as the return around 13D announcement and

exit date, and the return on the holding period.

3 Empirical Strategy

3.1 Short Sale Measures

As Figure 2 displays, I consider two time windows (A and B) before exit announcement to calculate changes in the short interest. I choose 60 days to make sure that at least one monthly short interest observation falls in each time window. Comparing the monthly short interests in these time windows, I build two measures, *Normalized Change* in short interest and *Change Dummy*, to test the variations in short interest level before exit announcement. *Normalized Change* is equal to change in short interest level from period A to period B normalized by the number of total outstanding shares. *Change Dummy* indicates activisms that fall in the top 10 percentile of the normalized change distribution. This dummy measure allows me to check which targets fall in the right tale of normalized change distribution and marks the observations in which short interest increase abnormally.

[Figure 2 about here]

3.2 Repetitive Short Sale

Currently there is no information on the short sellers and all databases have short interest data just on the firm level. Showing that the short interest increase is more common amongst firms that are targeted by a group of hedge fund activists leads us to the identity of short sellers. To test repetitive short selling, I define a history variable for each activist that measures how many times previous targets of the activist face an increase in the short interest before exit announcements. Results in Table 3 columns one and two imply that facing one short interest increase in a previous target raises the probability of facing it in the

new target by 0.8 percentage point. Compared to average 11 percent probability of facing an increase in the short interest, 0.8 percentage point increase is considerable. This result is consistent with the hypothesis that not all the activists but only group of them employ silent exiting strategy, offsetting positions via shorting targets' stock.

To mitigate the endogeneity concern when more experienced activist has the higher probability to face another spike in short interest, I normalized the history variable by the activist experience, number of his previous engagements, and run the same tests. As columns three and four in Table 3 show the results stay the same. Based on the coefficients in these columns, if an activist faces short sale increase in 20% of his previous targets, the probability that he faces that in his new target rises by 5.6%.

3.3 Short Sale and Funds' Characteristics

I next investigate the relation between attributes of activists and short sale variations before exit announcement. First, I examine which types of activists engage in exiting strategy via short selling. I use four attributes to define activist funds: the average of 13D announcement return, the average of holding return, average size of previous investments, and the number of their previous engagements.

Columns one and two in Table 4 imply that funds with more experience face increase in short interest more than other funds. Excluding observations without accurate exit date (exit date calculated based on 13D amendments), I run the same tests and observe similar results. I present this result in columns three and four of Table 4. Therefore, I continue my analysis by focusing on the effect of funds' experience on increase in the short interest before exit announcements.

Before moving to the next section, it is worth mentioning that there are many fund characteristics that are left uninvestigated. For instance, Funds' asset under management

and opacity can explain portion of the variation that we observe in the short interest.

3.3.1 Univariate Analysis on Experience

I formalize my tests on my sample by conducting univariate tests of short selling prior to exit announcements according to funds' experience (shown in Panels A, B of Table 5). In panel A, we observe that funds whose targets face an increase in short interest are more experienced activists. As this table indicates, funds that face an increase in short interest for the first time are more experienced than funds that have not faced any spike in short interest. History variable in these tables includes both activists' current engagement and previous engagements.

I compare the experience mean and the median of the funds that categorized in separate groups based on their history (including current engagement) in panel B, and the results comply with the first panel.

3.4 Prediction vs. Risk Aversion

Up to now, I have shown that there is a correlation between funds' experience and increase in short interest. Yet I have not explained the line of reasoning behind this correlation. Assuming short selling by experienced activists is the reason for spike in the short interest, I propose two possible hypotheses that can explain results in previous sections and rule out one of these hypotheses empirically in following parts.

3.4.1 Two Alternative Hypotheses

Funds that have more experience have established some reputation and have more resources (human capital and money). Hence, it is possible that these funds are better at predicting market reaction to their exit announcement and tend to lock their investments' profit before the reaction. If that is the case, we should observe that targets of these funds

face increase in short interest when market reacts negatively to the exit announcement. Moreover, evidence should imply that firms that are targeted by activists have a higher chance of facing an increase in short interest when he has experienced jumps in his previous targets' short interest and exit return is negative.

H2-a (Prediction): Activists who have experienced jump in their previous targets employ silent exiting more compared to other funds because they are better at predicting stock return around exit announcement.

Another possible hypothesis that explains the results is risk aversion, more reputation a hedge fund has more risk averse it gets. Since it is hard to survive as a successful hedge fund in the market and build a reputation, hedge funds follow less risky strategies in their investments to preserve their reputation capital. Therefore, they are ready to pay extra premium for a safer strategy and sell off part of their position through short sale.

H2-b (Risk Aversion): Activists who have experienced jump in their previous targets employ silent exiting more than other activists because they are more risk averse than other funds.

3.4.2 Empirical Results

Table 6-Panel A examines the determinants of the exit announcement period returns. It reports the regression coefficients, and the associated t statistics in parenthesis based on heteroskedasticity-consistent industry-clustered standard errors, of different specifications of the following regression explaining the exit announcement returns:

$$NormalizedChange(ChangeDummy) = \gamma X + \beta_1 Exitret + \beta_2 History + \beta_3 Exitret \times History + \epsilon$$

β_1 shows how activists' prediction of exit return affects their decision to short sell. To find out which hypothesis can better explain the relation between increase in the short

interest and funds' history, it requires interpreting β_1 and β_3 together. If the first hypothesis holds, activists who shorted before exit announcements in their previous targets short sell when they expect the market to react negatively to the announcement. In addition, since the assumption claims that these activists are better at predicting price movements at the time of announcement, I also expect to see β_3 negative and significant. However, even if both coefficients are significant and negative, second hypothesis is not proved yet. These coefficients could be the result of difference between right tales of exit return distribution in the subsample consisting of observations in which short interest increase and exit return distribution in rest of the sample.

As in Panel A in Table 6 β_1 is negative and significant but β_3 is not significant. To confirm the results, I repeat this test using the normalized history variable. Coefficients in both columns three and four also reject the prediction hypothesis. To understand the reason behind negative coefficient of exit return, I show a univariate analysis of exit returns in Table 7. This table shows that the exit return distribution in the subsample consisting of observations in which short interest increase is similar to the distribution in rest of the sample in the left tale. Thus, the difference in the right tales makes the exit return coefficient negative.

To make sure that my findings are not the results of differences between funds that face short interest spike and other funds, I rerun all the mentioned tests on the sample which consists of observations of funds that face short interest increase at least once in their engagements. Panel B in Table 6 implies that the results stay the same.

Putting all these results together, I conclude that activists use silent exiting strategy, exiting through short sale, when the distribution of expected exit return is not skewed to the right side and the buy and hold return in the period between 13D announcement and exit announcement is positive. In sum, the risk aversion hypothesis can better explain these

findings.

3.5 Additional Checks

Previous results indicate that there is a relation between exit announcement and variation in short interest level. However, I have not ruled out the reverse causality, activist starts exiting after sudden increase in short interest, and simultaneity, decision to exit and short sale increase happening at the same time. If reverse causality or simultaneity explains correlation between increases in short interest and funds' decision to exit, then we should observe negative price movement before exit announcement. To test them, I control for buy and hold returns in different time windows before exit announcement.

Column one through six in Table 8 (Panel A and B) show the results when I control for buy and hold return in different time windows between exit announcement and exit announcement. Results stay the same after I control for the buy and hold return in different time intervals.

Up to now I have tested two out of three alternative explanations for observing an increase in short interest before exit announcement and rule them out. However, there is another channel, information leakage, which explains the results. In the previous section, I argue that why this channel is not the reason behind a spike in short interest, and in the next section, I discuss and propose possible ways and identification strategies that help dealing with this concern.

4 Conclusions

I find evidences regarding activist targets and short interest variations. Tracking short interest level in hedge fund activists targets I show that, for a group of hedge fund activists, there is a jump in short interest level for the targets stock before the funds announce their

exit decision. This suggests activist funds short sell to offset part of their position in their targets before exit announcements. However, there are other alternative hypotheses such as reverse causality, simultaneity, and information leakage. To rule out reverse causality and simultaneity, I control for holding returns in different time windows before exit announcement and show that results stay the same. Based on the symmetric distribution of the return around exit announcements in the subsample consisting of engagements in which they face a jump in the short interest, information leakage could not explain results on the relation between short interest jumps and exit announcements.

My findings also suggests that experienced funds are more likely to exit via short selling. However, I do not find any significant relation between other activist funds characteristics and the increase in short interest.

Finally, I show that skills in predicting market reaction to exit announcement do not explain why activists choose this strategy. Using univariate analysis, OLS and Probit model, I claim that hedge funds offset part of their position in their targets via shorting the same stock as a safe exit strategy and a way to lock their profits.

References

Admati, A. R. and Pfleiderer, P. (2009). The wall street walk and shareholder activism: Exit as a form of voice. *Review of Financial Studies*, page hhp037.

Bebchuk, L. A., Brav, A., and Jiang, W. (2014). The long-term effects of hedge fund activism. *Forthcoming, Columbia Law Review*, 114:13–66.

Becht, M., Franks, J., Mayer, C., and Rossi, S. (2010). Returns to shareholder activism: Evidence from a clinical study of the hermes uk focus fund. *Review of Financial Studies*, 23(3):3093–3129.

Becht, M., Franks, J. R., Grant, J., and Wagner, H. F. (2015). The returns to hedge fund activism: An international study.

Bharath, S. T., Jayaraman, S., and Nagar, V. (2013). Exit as governance: An empirical analysis. *The Journal of Finance*, 68(6):2515–2547.

Boyson, N. M., Ma, L., and Mooradian, R. M. (2015). Performance persistence in hedge fund activism. *Available at SSRN 2578262*.

Brav, A., Jiang, W., and Kim, H. (2012). The real effects of hedge fund activism: Productivity, risk, and product market competition. *US Census Bureau Center for Economic Studies Paper No. CES-WP-12-14*.

Brav, A., Jiang, W., and Kim, H. (2013). The real effects of hedge fund activism: Productivity, asset allocation, and product market concentration. *Available at SSRN*.

Brav, A., Jiang, W., Partnoy, F., and Thomas, R. (2008). Hedge fund activism, corporate governance, and firm performance. *The Journal of Finance*, 63(4):1729–1775.

Clifford, C. P. (2008). Value creation or destruction? hedge funds as shareholder activists. *Journal of Corporate Finance*, 14(4):323–336.

Dai, R., Massoud, N., Nandy, D. K., and Saunders, A. (2011). Hedge funds in m&a deals: Is there exploitation of private information? *Available at SSRN 1742641*.

Del Guercio, D., Seery, L., and Woidtke, T. (2008). Do boards pay attention when institutional investor activists just vote no? *Journal of Financial Economics*, 90(1):84–103.

Edmans, A., Fang, V. W., and Zur, E. (2013). The effect of liquidity on governance. *Review of Financial Studies*, page hht012.

Edmans, A. and Manso, G. (2011). Governance through trading and intervention: A theory of multiple blockholders. *Review of Financial Studies*, 24(7):2395–2428.

Gantchev, N. (2013). The costs of shareholder activism: Evidence from a sequential decision model. *Journal of Financial Economics*, 107(3):610–631.

Gopalan, R. (2005). Large shareholder trading and takeovers: The disciplinary role of voting with your feet. *Available at SSRN 891515*.

Greenwood, R. and Schor, M. (2009). Investor activism and takeovers. *Journal of Financial Economics*, 92(3):362–375.

Hu, H. T. and Black, B. (2007). Hedge funds, insiders, and the decoupling of economic and voting ownership: Empty voting and hidden (morphable) ownership. *Journal of Corporate Finance*, 13(2):343–367.

Hu, H. T. and Black, B. S. (2006). The new vote buying: Empty voting and hidden (morphable) ownership. *As published in Southern California Law Review*, 79:811–908.

Kahan, M. and Rock, E. B. (2007). Hedge funds in corporate governance and corporate control. *University of Pennsylvania Law Review*, pages 1021–1093.

Kang, N., Ozik, G., and Sadka, R. (2015). Fund structure and the long-run performance of activism. *Working Paper*.

Klein, A. and Zur, E. (2009). Entrepreneurial shareholder activism: Hedge funds and other private investors. *The Journal of Finance*, 64(1):187–229.

Krishnan, C., Partnoy, F., and Thomas, R. S. (2015). Top hedge funds and shareholder activism. *Available at SSRN 2589992*.

Martin, S. and Partnoy, F. (2005). Encumbered shares. *U. Ill. L. Rev.*, page 775.

Massoud, N., Nandy, D., Saunders, A., and Song, K. (2011). Do hedge funds trade on private information? evidence from syndicated lending and short-selling. *Journal of Financial Economics*, 99(3):477–499.

Partnoy, F. and Thomas, R. S. (2007). Gap filling, hedge funds, and financial innovation.

Wachtell Lipton (2008). Beneficial ownership of equity derivatives and short positionsa modest proposal to bring the 13d reporting system into the 21st century. `http://www.wlrk.com/webdocs/wlrknew/WLRKMemos/WLRK/WLRK.15395.08.pdf`.

Zur, E. (2009). The power of reputation: Hedge fund activists. AAA.

Figure 1: Yearly Distribution of 13D Engagements

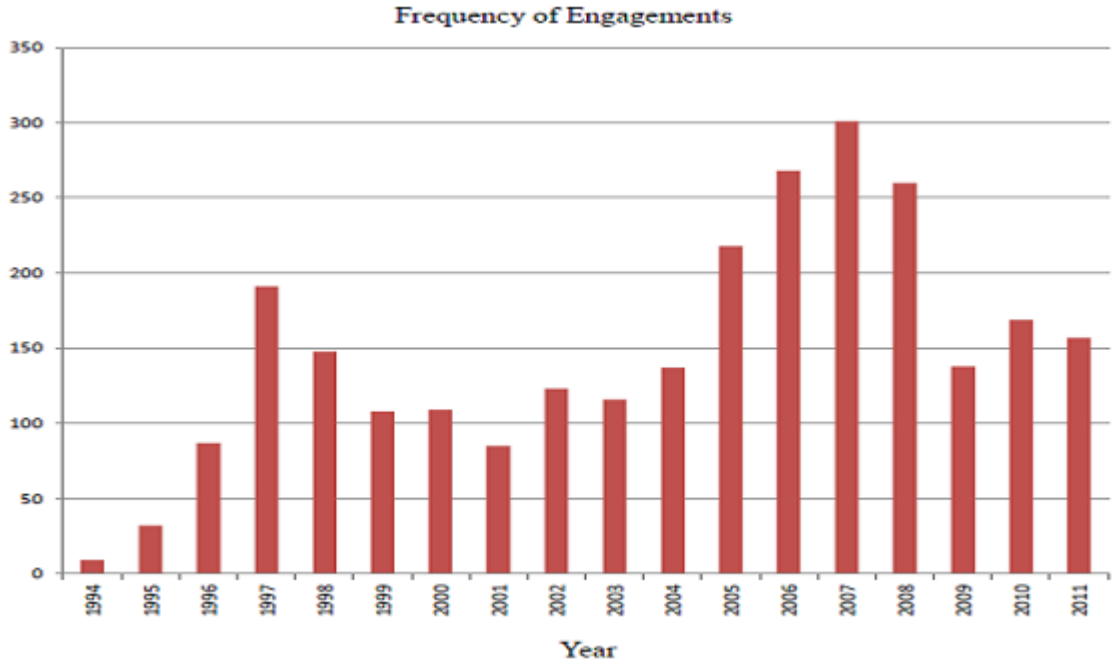


Figure 2: Short Sale Proxies

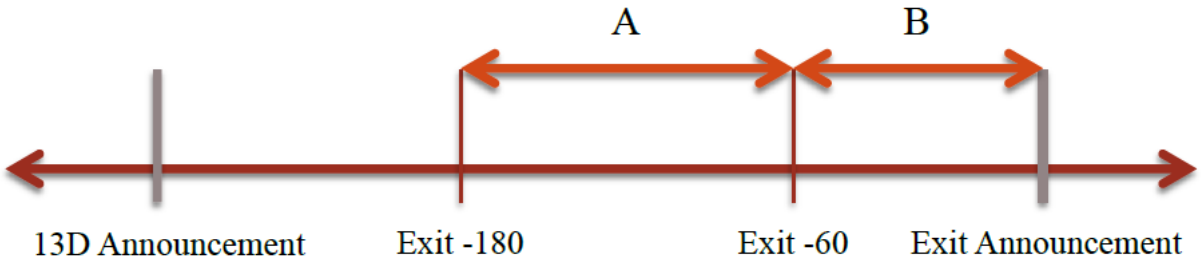


Table 1: Control variables Description

Variables	Description
ROA	Return (Net Income) on Assets
Amihud	Yearly Average of 1000*(—Daily Return—/Trading Volume)$\hat{0}$.5, using daily data
M/B	Market Value of Equity to Book Value of Equity
Cash-ratio	(Cash + Cash equivalents)/Assets
Institutional Shareholders	the Number of Institutional Shareholders
Institutional Ownership	Portions of Targets that are Owned by Institutional Shareholders
Market Value	Firm's Stock Value
age	Firm's Age
Leverage-ratio	Total Debt/Assets

Table 2.Panel A: Sample Description and Summary Statistics

Sample Description	No. of Observation	No. of Funds
Total	2656	479
After dropping low-frequent investors	1692	132
After dropping observations without exit date	1496	124
After dropping observations without 13D/A exit date	863	117

Table 2.Panel B: Yearly Distribution

Year	Freq.	Percent
1994	9	0.34
1995	32	1.2
1996	87	3.28
1997	191	7.19
1998	148	5.57
1999	108	4.07
2000	109	4.1
2001	85	3.2
2002	123	4.63
2003	116	4.37
2004	137	5.16
2005	218	8.21
2006	268	10.09
2007	301	11.33
2008	260	9.79
2009	138	5.2
2010	169	6.36
2011	157	5.91
Total	2656	100

Table 2.Panel C: Industry Distribution

Industry Groups	Freq.	Percent
Consumer NonDurables	130	4.950
Consumer Durables	61	2.320
Manufacturing	225	8.570
Oil, Gas, and Coal Extraction	90	3.430
Chemicals and Allied Products	46	1.750
Business Equipment	547	20.83
Telephone and Television Transmission	97	3.690
Utilities	37	1.410
Wholesale, Retail, and Some Services	296	11.27
Healthcare, Medical Equipment, and Drug	320	12.19
Finance	397	15.12
Other	380	14.47
Total	2,626	100

Table 2.Panel D: Experience Distribution

Funds experience	Freqency	Percent
<3	275	57.41
3	40	8.350
4	27	5.640
5	18	3.760
6	21	4.380
7	10	2.090
8	8	1.670
9	13	2.710
10	6	1.250
11	9	1.880
12	3	0.630
13	5	1.040
14	4	0.840
15	2	0.420
16	5	1.040
17	4	0.840
18	1	0.210
19	2	0.420
>=20	26	5.43
Total	479	100

Table 2. Panel E: Summary Statistics of Targets Characteristics

stats	ROA	Amihud	M/B	Cash-ratio	Institutional Shareholders	Institutional Ownership	Market Value	age	Leverage-ratio
mean	-0.0171	0.524	3.882	0.213	48.09	0.451	0.687	14.85	0.325
median	0.0480	0.302	2.285	0.109	26	0.395	0.137	11	0.156
sd	0.298	0.549	6.632	0.237	66.28	0.603	2.496	11.28	0.446

Table 2. Panel F: Summary Statistics of Abnormal Returns Around 13D Announcements, Holding Period, and Exit Announcements

	CAR (13D-5, 13D+5)	CAR (13D-10, 13D+10)	CAR (exit-5, exit+5)	CAR (13D-10, exit-5)
mean	0.0543	0.0678	0.0342	0.200
median	0.0386	0.0530	0.0145	0.00391
sd	0.119	0.162	0.167	1.420

Table 3: Normalized Change is equal to change in short interest level normalized by the number of total outstanding shares. Change Dummy indicates engagements that fall in the top 10 percentile of the normalized change distribution. Short History is the number of funds previous engagements in which short interest jumps before the exit announcement. Normalized Short History is equal to Short History that is normalized by funds experience. All t-statistics adjust for heteroscedasticity and are clustered by industry. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels.

Dependent Variable:	Normalized Change	Change Dummy	Normalized Change	Change Dummy
ROA	0.0044	-1.4241***	0.0056	-1.3174***
	(0.010)	(0.506)	(0.009)	(0.448)
Amihud	-0.0026*	-2.3696***	-0.0022*	-2.0887***
	(0.001)	(0.652)	(0.001)	(0.579)
M/B	0.0005*	0.0294	0.0004	0.0306
	(0.000)	(0.020)	(0.000)	(0.019)
Cash-ratio	-0.0009	-0.4137	0.0001	-0.3264
	(0.003)	(0.395)	(0.003)	(0.390)
Institutional Shareholders	-0.0000	0.0017	-0.0000	0.0011
	(0.000)	(0.002)	(0.000)	(0.002)
Institutional Ownership	-0.0062**	-0.4205	-0.0051	-0.3127
	(0.003)	(0.372)	(0.003)	(0.390)
Age	-0.0001	-0.0047	-0.0000	-0.0012
	(0.000)	(0.003)	(0.000)	(0.004)
Market Value	0.0001	-0.0644	0.0002	-0.0680
	(0.000)	(0.062)	(0.000)	(0.078)
Leverage-ratio	0.0028	0.0934	0.0030	0.1555
	(0.002)	(0.193)	(0.002)	(0.178)
Pre-exit return	-0.0000	0.0703	0.0002	0.0918
	(0.000)	(0.071)	(0.000)	(0.064)
Short Sell History	0.0010***	0.0611***		
	(0.000)	(0.017)		
Normalized Short Sell History			0.0313*	1.9415**
			(0.015)	(0.850)
Constant	0.0018	-0.5458*	0.0008	-0.7244**
	(0.003)	(0.329)	(0.003)	(0.336)
Industry Fixed Effect	Yes	Yes	Yes	Yes
Observations	586	586	586	586
R-squared	0.0490	-	0.0385	-
Adj. R-squared/Pseudo R-squared	0.0308	0.1274	0.0200	0.1182

Table 4: Normalized Change is equal to change in short interest level normalized by the number of total outstanding shares. Change Dummy indicates engagements that fall in the top 10 percentile of the normalized change distribution. All t-statistics adjust for heteroscedasticity and are clustered by industry. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels.

Sample:	Observations with 13D and 13F exit date		Observations with 13D exit date	
Dependent Variable:	Normalized Change	Change Dummy	Normalized Change	Change Dummy
ROA	0.0038	-1.4048**	0.0028	-1.1646
	(0.012)	(0.550)	(0.014)	(0.718)
Amihud	-0.0029*	-2.4964***	-0.0041**	-2.1893***
	(0.001)	(0.791)	(0.002)	(0.754)
M/B	0.0004	0.0271	0.0004	0.0357**
	(0.000)	(0.022)	(0.000)	(0.015)
Cash-ratio	-0.0002	-0.3025	-0.0089	-0.8477
	(0.004)	(0.443)	(0.006)	(0.678)
Institutional Shareholders	-0.0000	0.0019	-0.0000	0.0022
	(0.000)	(0.002)	(0.000)	(0.002)
Institutional Ownership	-0.0042	-0.2863	-0.0034	-0.5025
	(0.003)	(0.343)	(0.004)	(0.417)
Age	-0.0000	-0.0040	-0.0001	-0.0033
	(0.000)	(0.003)	(0.000)	(0.005)
Market Value	-0.0001	-0.0717	0.0000	-0.0603
	(0.000)	(0.056)	(0.000)	(0.050)
Leverage-ratio	0.0030	0.0746	0.0015	-0.1190
	(0.002)	(0.200)	(0.002)	(0.266)
Pre-exit return	-0.0001	0.0822	0.0001	0.1274
	(0.000)	(0.080)	(0.000)	(0.103)
Average Holding Return (Last Two Engagements)	0.0006	0.0056	0.0015	-0.0068
	(0.003)	(0.292)	(0.004)	(0.254)
Experience Number	0.0001***	0.0052**	0.0001*	0.0053**
	(0.000)	(0.002)	(0.000)	(0.002)
Average Announcement Return	-0.0016	-0.0047	-0.0008	-0.0039
	(0.002)	(0.205)	(0.002)	(0.218)
Average Investment Size (Last Two Engagements)	-0.0069	-0.0914	-0.0059	-0.9376
	(0.007)	(0.751)	(0.006)	(0.606)
Constant	0.0012	-0.6523	0.0052	-0.4350
	(0.004)	(0.403)	(0.004)	(0.550)
Industry Fixed Effect	Yes	Yes	Yes	Yes
Observations	540	540	336	336
R-squared	0.0424	-	0.0469	-
Adj. R-squared/Pseudo R-squared	0.0168	0.1235	0.0053	0.1195

Table 5-Panel A: Univariate Analysis of Experience Dummy and Short Sale History

History of Short Sale (Including Current Engagement)	Experience Dummy(¿30)=1 (%)	Experience Dummy(¿30)=0 (%)
0	7.5	92.5
1	29.03	70.97
2	34.78	65.22
3	30.61	69.39
4	69.23	30.77
5	76.67	23.33
6	90	10
7	100	0
8	100	0
9	100	0
>=10	100	0

Table 5-Panel B: Univariate Analysis of Experience Number and Short Sale History

History of Short Sale (Including Current Engagement)	Experience (mean)	Experience (median)
0	12.28	9
1	20.39	16
2	26.2	12.5
3	25.92	21
4	57.08	72
5	66.43	69.5
6	88	111
7	123.2	123
8	131.7	131.5
9	139	139
10	144	144

Table 6-Panel A: Normalized Change is equal to change in short interest level normalized by the number of total outstanding shares. Change Dummy indicates engagements that fall in the top 10 percentile of the normalized change distribution. Short History is the number of funds previous engagements in which short interest jumps before exit announcements. Normalized Short History is equal to Short History that is normalized by funds experience. All t-statistics adjust for heteroscedasticity and are clustered by industry. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels.

Dependent Variable:	Change Dummy	Change Dummy	Change Dummy	Change Dummy
ROA	-1.2349**	-1.2406**	-1.1368**	-1.1147**
	(0.498)	(0.494)	(0.454)	(0.446)
Amihud	-2.2683***	-2.2355***	-2.0055***	-1.9687***
	(0.611)	(0.590)	(0.565)	(0.533)
M/B	0.0269	0.0266	0.0283	0.0277
	(0.021)	(0.021)	(0.020)	(0.020)
Cash-ratio	-0.3761	-0.3940	-0.2699	-0.2750
	(0.344)	(0.344)	(0.341)	(0.343)
Institutional Shareholders	0.0012	0.0012	0.0006	0.0008
	(0.002)	(0.002)	(0.002)	(0.002)
Institutional Ownership	-0.4776	-0.4694	-0.3827	-0.3994
	(0.356)	(0.363)	(0.365)	(0.359)
Age	-0.0499	-0.0494	-0.0492	-0.0511
	(0.056)	(0.056)	(0.067)	(0.065)
Market Value	-0.0028	-0.0030	0.0003	0.0005
	(0.003)	(0.004)	(0.004)	(0.004)
Leverage-ratio	0.0545	0.0472	0.1148	0.1103
	(0.186)	(0.185)	(0.169)	(0.168)
Pre-exit return	-0.9029**	-0.7226*	-0.9611**	-0.5210
	(0.457)	(0.393)	(0.480)	(0.520)
Short Sell History	0.0580***	0.0582***		
	(0.015)	(0.015)		
Short Sell History*Pre-Exit return		-0.0674		
		(0.077)		
Normalized Short Sell History			1.7684**	1.8206**
			(0.835)	(0.849)
Normalized Short Sell History*Pre-Exit return				-5.3440
				(3.862)
Constant	-0.4853*	-0.4906*	-0.6476**	-0.6640**
	(0.288)	(0.289)	(0.295)	(0.292)
Industry Fixed Effect	Yes	Yes	Yes	Yes
Observations	603	603	603	603
Pseudo R-squared	0.125	0.1257	0.1161	0.1185

Table 6-Panel B: The subsample consists of observations of funds that face short interest increase at least once in their engagements. Normalized Change is equal to change in short interest level normalized by the number of total outstanding shares. Change Dummy indicates engagements that fall in the top 10 percentile of the normalized change distribution. Short History is the number of funds previous engagements in which short interest jumps before exit announcements. Normalized Short History is equal to Short History that is normalized by funds experience. All t-statistics adjust for heteroscedasticity and are clustered by industry. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels.

Dependent Variable:	Change Dummy	Change Dummy	Change Dummy	Change Dummy
ROA	-1.3855***	-1.3870***	-1.3396***	-1.3197***
	(0.511)	(0.510)	(0.493)	(0.497)
Amihud	-2.1055***	-2.0802***	-1.9971***	-1.9655***
	(0.516)	(0.501)	(0.466)	(0.445)
M/B	0.0263	0.0261	0.0246	0.0243
	(0.019)	(0.019)	(0.020)	(0.019)
Cash-ratio	-0.3798	-0.3941	-0.3348	-0.3434
	(0.364)	(0.365)	(0.352)	(0.352)
Institutional Shareholders	0.0005	0.0005	0.0005	0.0006
	(0.002)	(0.002)	(0.002)	(0.002)
Institutional Ownership	-0.5709	-0.5625	-0.5131	-0.5179
	(0.410)	(0.421)	(0.400)	(0.399)
Age	-0.0406	-0.0404	-0.0471	-0.0486
	(0.067)	(0.067)	(0.071)	(0.070)
Market Value	-0.0023	-0.0024	-0.0004	-0.0004
	(0.004)	(0.004)	(0.004)	(0.004)
Leverage-ratio	0.1932	0.1884	0.2395	0.2374
	(0.181)	(0.181)	(0.170)	(0.170)
Pre-exit return	-1.1507**	-1.0174**	-1.1915**	-0.8818
	(0.504)	(0.449)	(0.485)	(0.747)
Short Sell History	0.0287*	0.0288*		
	(0.016)	(0.016)		
Short Sell History*Pre-Exit return		-0.0380		
		(0.068)		
Normalized Short Sell History			0.0686	0.1078
			(1.034)	(1.059)
Normalized Short Sell History*Pre-Exit return				-3.0791
				(4.592)
Constant	-0.1527	-0.1586	-0.1843	-0.2007
	(0.306)	(0.310)	(0.305)	(0.311)
Industry Fixed Effect	Yes	Yes	Yes	Yes
Observations	423	423	423	423
Pseudo R-squared	0.0961	0.0963	0.091	0.0917

Table 7-Panel A: Sample consists of all observations that have short sale information.

Normalized Change< 1%									
Statistics	mean	p5	p10	p25	p50	p75	p90	p95	sd
Exit Return	0.0426	-0.141	-0.0953	-0.0291	0.0152	0.0837	0.191	0.287	0.187
Normalized Change> 1% (Top 10 percentile)									
Statistics	mean	p5	p10	p25	p50	p75	p90	p95	sd
Exit Return	0.0231	-0.129	-0.0868	-0.0302	0.0226	0.0722	0.139	0.220	0.146

Table 7-Panel B: Sample consists of all observations that have short sale information.

Normalized Change< 1%									
Statistics	mean	p5	p10	p25	p50	p75	p90	p95	sd
Exit Return	0.0425	-0.127	-0.077	-0.024	0.0145	0.0819	0.178	0.274	0.152
Normalized Change> 1% (Top 10 percentile)									
Statistics	mean	p5	p10	p25	p50	p75	p90	p95	sd
Exit Return	0.00137	-0.149	-0.118	-0.0528	0.00803	0.0626	0.123	0.171	0.142

Table 8-Panel A: Normalized Change is equal to change in short interest level normalized by the number of total outstanding shares. Change Dummy indicates engagements that fall in the top 10 percentile of the normalized change distribution. Short History is the number of funds previous engagements in which short interest jumps before exit announcements. Targets characteristics are controlled for in the regressions. All t-statistics adjust for heteroscedasticity and are clustered by industry. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels.

Return Based-Control Variable:	Pre-Exit Return (13D-10, Exit-5)		Return (13D-10, Exit-60)		Return (13D-10, Exit-30)	
Model:	OLS Model	Probit Model	OLS Model	Probit Model	OLS Model	Probit Model
Dependent Variable:	Normalized Change	Change Dummy	Normalized Change	Change Dummy	Normalized Change	Change Dummy
Return Based-Control Variable:	-0.0000	0.0703	-0.0001	0.0700	-0.0001	0.0388
	(0.000)	(0.071)	(0.000)	(0.073)	(0.000)	(0.048)
Short Sell History	0.0010***	0.0611***	0.0005*	0.0348**	0.0005*	0.0346**
	(0.000)	(0.017)	(0.000)	(0.015)	(0.000)	(0.015)
Constant	0.0018	-0.5458*	0.0020	-0.5198**	0.0020	-0.5061*
	(0.003)	(0.329)	(0.003)	(0.265)	(0.003)	(0.265)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	586	586	684	684	681	681
R-squared	0.0490	-	0.033	-	0.033	-
Adj. R-squared/Pseudo R-squared	0.0308	0.1274	0.0172	0.1024	0.0171	0.1018

Table 8-Panel B: Normalized Change is equal to change in short interest level normalized by the number of total outstanding shares. Change Dummy indicates engagements that fall in the top 10 percentile of the normalized change distribution. Short History is the number of funds previous engagements in which short interest jumps before exit announcements. Targets characteristics are controlled for in the regressions. All t-statistics adjust for heteroscedasticity and are clustered by industry. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels.

Return Based-Control Variable:	CAR (Exit-60, Exit-10)		CAR (Exit-30, Exit-10)		CAR (Exit-10, Exit)	
Model:	OLS Model	Probit Model	OLS Model	Probit Model	OLS Model	Probit Model
Dependent Variable:	Normalized Change	Change Dummy	Normalized Change	Change Dummy	Normalized Change	Change Dummy
Return Based-Control Variable:	0.0018	-0.0429	0.0050	0.1710	0.0046	-0.5966
	(0.004)	(0.349)	(0.005)	(0.477)	(0.005)	(0.439)
Short Sell History	0.0005*	0.0385***	0.0005*	0.0388**	0.0005*	0.0392***
	(0.000)	(0.014)	(0.000)	(0.016)	(0.000)	(0.015)
Constant	0.0031	-0.4416	0.0032	-0.4394	0.0033	-0.4850
	(0.002)	(0.309)	(0.002)	(0.301)	(0.003)	(0.299)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	671	671	671	671	649	649
R-squared	0.0328	-	0.0339	-	0.0339	-
Adj. R-squared/Pseudo R-squared	0.0167	0.1082	0.0177	0.1084	0.0172	0.1093