Top Hedge Funds: The Importance of Reputation in Shareholder Activism

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Abstract

We examine how hedge fund characteristics matters for announcement period returns. Using a large dataset of hand-collected information on post-financial-crisis activist interventions through mid-2014, we find that recent activism generates high and persistent announcement period returns: an average of more than 7% over the 21-day event window. These returns have persisted even as both the number of activists and their interventions have increased. But, intervening with large investments in large targets is significantly and positively related to announcement period returns, whereas intervening more frequently is negatively associated with announcement period returns. We develop a hedge fund reputation measure that is based on the size of investments in the recent past. The most reputed hedge funds have more assets under management, a longer track record of activism, a history of obtaining board seats, and invest in targets with the intent of making board changes. Top activists' reputations prove to have been deserved: their targets enjoy superior operating performance post intervention.

*Keywords***:** Hedge funds, Shareholder Activism, Hedge fund reputation, Hedge fund investments, Post-intervention performance, Selection bias control, Hedge fund Capital under management, Hedge fund number of Portfolio Companies, Hedge fund Board Seats, Anti-takeover Provisions.

1. Introduction

We examine recent hedge fund activism events using a hand-collected dataset of 1003 interventions from 2008 through mid-2014. The literature on hedge fund activism has largely focused on the characteristics of target firms and the changes brought about in target firms by activists. However, the characteristics – and reputations – of the activists remain unexamined. We seek not only to update the previous literature with respect to activism announcement returns, but also to shift the literature's focus from the targets of activism to the activists themselves. Who are the most reputed hedge fund activists? This is a question we address in this paper.

Studies such as those of Clifford (2007), Brav, Jiang, Partnoy and Thomas (2008), Bebchuk, Brav and Jiang (2013), Klein and Zur (2009), and Becht et al. (2014) suggest that hedge fund activism generated significantly higher announcement period abnormal stock returns than a control sample of passive block holders, and that hedge fund activists achieved measurable success, at least in terms of traditional metrics of financial performance such as Tobin's Q. Bebchuk, Brav and Jiang (2013) find that hedge fund activism through 2007 was followed by improved operating performance during the five years after intervention.

Although Brav, Jiang, Partnoy and Thomas (2008) and others report a declining trend of returns year by year from 2001 through 2006, we find that this trend more recently has reversed: the announcement period abnormal stock price returns from hedge fund activism are consistently and robustly high from 2008 through 2014. For example, during the 21-day event window, the average announcement period abnormal stock price return for interventions during 2013 is over 10%, and for our entire sample is over 7%. We find that abnormal stock returns increase as the event window becomes longer, consistent with Brav, Jiang, Partnoy and Thomas (2008) and Bebchuk, Brav, and Jiang (2013). The average size of equity positions taken by hedge fund activists is in the range of 8%, also consistent with previous studies.

However, our sample illustrates how the market structure of the hedge fund activist industry has changed since the earlier time periods studied. We find that the industry has become larger and more dispersed, with both more participants and more targets.[1] Our sample includes 578 different activist hedge funds in contrast to the 236 activist hedge funds analyzed

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[1] Indeed, since the end of 2009, the amount of money in activist hedge funds has jumped from $36 billion to $112 billion, according to *Hedge Fund Research*, reported in *Fortune*, December 22, 2014.

in Brav, Jiang, Partnoy, and Thomas (2008). Moreover, no hedge fund activist in our sample has a substantial share of the market. Even those hedge fund activists with the largest numbers of interventions have relatively small market shares: the highest market share in terms of number of interventions is roughly 3%, and only a handful of activists have market shares of more than 1%. The industry market structure is somewhat more concentrated when interventions are measured based on the aggregate market capitalization of investments, but still only a couple of firms each year have market shares in the range of 10% and above; the vast majority of firms' market shares are below 1%. Based on the Herfindahl-Hirshman Index measures used by the Department of Justice to assess market concentration, the hedge fund activism industry would not be considered highly concentrated, or even moderately concentrated. Accordingly, any abnormal returns are not likely due to monopoly or oligopoly rents.

What is the source of these extraordinary market returns? To investigate that question, we explore the extent to which returns vary based on the activists' reputations. Specifically, we examine three measures of hedge fund reputation, constructed free of look-ahead bias, based on (1) frequency of intervention, (2) past success, and (3) financial clout and expertise. We draw on the existing literature for support for each of these three measures.

First, hedge fund activists might acquire positive reputations based on expertise they gain from intervening more frequently. For example, Gompers (1996), Gompers et al. (2008), and Ljungqvist, Richardson, and Wolfenzon (2008) argue that younger venture capital firms may benefit from investing more frequently and rapidly in order to signal their skills and acquire a reputation. This "frequency of intervention" theory is consistent with the notion that participants in a wide range of areas – medicine, sports, business, and academia – acquire positive reputations based on the number of times they have been involved in the relevant procedures or practices.

Second, hedge fund activists might acquire positive reputations based on high returns in the recent past. A long-standing literature (e.g., Stickel, 1992) establishes that there can be a positive relationship between returns and reputation in various contexts. This "past returns" theory is consistent with the notion that investment funds with strong past performance acquire positive reputations,[2] and is in line with the performance persistence argument put forth in

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[2] Kaplan and Schoar (2005) cite the notion that persistent venture capital returns are "crucially driven by the specific human capital or networks of a fund's GPs." Harris, Jenkinson, Kaplan, and Stucke (2014) find that venture capital partnerships in the top two performance quartiles tend to stay above the median

Boyson, Ma, and Mooradian (2015) for hedge funds. In other words, hedge fund reputation could be based on past performance. If the market felt that certain hedge fund managers are skilled at pushing for policy improvements at targeted firms, interventions by these managers would have been welcomed with strong stock market reactions upon announcements in the recent past, and expectations of performance is likely to persist.

Third, hedge fund activists might acquire positive reputations based on their financial clout and expertise. The literatures on private equity and venture capital (e.g., Hochberg, Ljungqvist, and Lu, 2007, and Nahata, 2008) establish the importance of venture capital size, networks, and experience in investment performance. This "clout and expertise" theory is consistent with the notion that activists who have demonstrated an ability to intervene with large investments in large targets, or in challenging scenarios, and might have better access to both capital (e.g., Diamond, 1989) and labor (e.g., Berk and van Binsbergen, 2015).

We find support for the third hypothesis, but reject the first two. Specifically, we find that hedge fund activists involved in the largest dollar investments in the recent past generate the largest announcement period abnormal returns in future interventions, whereas activists that had superior announcement period market reactions in the recent past generate smaller returns. Perhaps most surprisingly, hedge funds involved in more frequent, but smaller, interventions, perform worse than other hedge funds. We create a new measure of hedge fund reputation based on these findings. We call the top activists *Top Investor Hedge Funds,* based on the size of their aggregate investments in the recent past.

Top Investor Hedge Funds' investment announcements result in a 21-day announcement-period abnormal return of 12.3%, on average, in our sample period as compared to 6.6% for the other hedge funds of our sample, notwithstanding the fact that these top activists target significantly larger and better performing companies. We also find evidence that the market's apparent expectation of positive returns from activism by *Top Investor Hedge Funds* is well founded. Interventions by *Top Investor Hedge Funds* are associated with immediate improvements in targets' operating performance. Return on assets, sales revenue growth, and research and development spending at targets are all significantly higher after intervention by *Top Investor Hedge Funds*, as compared with other hedge funds. Moreover, the targets of *Top*

Investor Hedge Funds are significantly less likely to be delisted because of liquidation. Interestingly, *Top Investor Hedge Funds* target a significantly lower proportion of finance firms, as compared to other hedge funds, perhaps because finance firms are highly regulated, and therefore may be less attractive targets.

We recognize that the *Top Investor Hedge Funds* might have an advantage in selecting target firms. In other words, associations between top hedge fund involvement and target firm success can be complicated by a top hedge fund's unobserved criteria for involvement in a target. We control for this, using instrumental variables based on hedge fund features that predict hedge fund-target firm associations, but not investment returns. We find that the association between *Top Investor Hedge Funds* and announcement period abnormal returns not only remains significantly positive, but becomes stronger, after controlling for selection bias.

Examining the features of hedge fund activists, we find that *Top Investor Hedge Funds* have significantly more assets under management and hold more portfolio companies, as compared to other hedge funds. They also hold significantly more board seats at their portfolio companies, and explicitly signal their intent to replace one or more board members at the time of 13D filings.

Finally, we find that there are significantly more anti-takeover defenses at firms targeted by *Top Investor Hedge Funds* than at firms targeted by other hedge funds. This finding is striking: top activists generate abnormal returns even though they target firms that are most difficult to sell. Our results suggest that the positive results achieved by top activists are more likely to be due to operational improvements at companies they target rather than significant capital structure or dividend policy changes, as suggested by other papers in recent literature.

2. Data and Descriptive Statistics

We create a new database of activist events using hand collected data. Initially, we use Hedge Fund Solutions, LLC, ("HFS"), a commercially available, weekly newsletter that tracks all hedge fund activism on a continuing basis to gather information about activist events. To examine relatively more recent activist interventions, as well as to compare and contrast recent statistics with those in extant studies, we collect data on all events reported in HFS from January 1, 2008 until May 1, 2014.

Disclosure requirements applicable to all investment funds, including hedge funds, are the key that facilitates the study of hedge fund activism, including our study. Section 13(d) of the 1934 Exchange Act provides that all investors, including hedge funds, must file a Schedule 13D with the Securities and Exchange Commission within ten days of acquiring more than 5% of any class of securities of a publicly traded company if they have an interest in influencing the management of the company. Congress intended that the filing of a Schedule 13D would notify the market that the filer might seek to force changes or gain control at a target company. Accordingly, scholars have found that 13D filings could be viewed as a proxy for activism, and databases of 13D filings could be used to assess hedge fund activism more comprehensively.

We thus follow the now-standard approach in the literature: after acquiring from HFS information the name of the targeted company and the names of the hedge funds involved in the event, we use the Morningstar Document Research database to search for all 13D, 13D/A, 13G and 13G/A filings (collectively, "13D/G filings") made by the hedge funds that disclosed stakes in the targeted company's stock. Investors file Schedule 13D if they have an interest in influencing management of the targeted company. Hence we focus on 13D flings only, in this paper.

Once we assemble complete sets of all hedge funds' filings, we hand code the information needed for our analysis for the entire time period in which the hedge funds continue to make 13D filings in the targeted firm. This approach permits us to track all of the hedge funds' stock transactions, as well as any put or call transactions that they disclose, over the entire time period of their investment.

We also code the date of the announcement of the initial stake. After its initial filing under Section 13, the hedge funds are required to "promptly" file amendments to their initial filing if there are any "material" changes to their ownership stakes. These amendments provide us with a complete picture of the hedge funds' stock ownership position as on the date of filing, its stated purpose for engaging in the securities purchases, as well as any changes to that position over the course of its investment. Finally, we collect proxy contest data from Innisfree database for up to 1 year post announcement of activist stake, and code the date, objectives, and outcomes.

We then match this data with the CRSP database to obtain target firm stock returns and delisting data. We also match this data to the Quarterly Compustat database to obtain target

firm financial data for four quarters immediately preceding the intervention as well as quarters post-intervention. After these screens, we have 1003 shareholder activism events during our sample period of January 1, 2008 through May 1, 2014. Our methodology is consistent with earlier approaches in the literature, and supports a conclusion that we have collected the relevant 13D filings during our sample period. The data also support the proposition that hedge fund activism has been increasing in recent years. In comparison, Gantchev, Gredil and Jotikasthira (2014) observe 365 interventions from 2000-2011; Brav, Jiang, Thomas, and Partnoy (2008) observe 1,059 interventions from 2001-2006, and 757 from 1994-2000; and Bebchuk, Brav, and Jiang (2013) observe 1,283 interventions from 2001-2007.

To link hedge fund performance with hedge fund features, we collect data for 2010-13 on a number of hedge fund characteristics from Activist Insight. These include the number of top management and board personnel each year (including CEO, CFO, and COO, as well as board chairman, vice-chairman, and other directors); the number of portfolio companies invested in as of the end of each year; the number of portfolio companies on which the hedge fund holds at least one board seat as of the end of each year; and the total assets under management as of the end of each year. We also gather the hedge funds' year of formation and state of incorporation, and the industry sectors of their investments.

We gather data on six anti-takeover provisions from the Investor Responsibility Research Center database – on staggered boards, limits on shareholder bylaw amendments, poison pills, golden parachutes, supermajority voting requirements for mergers, and limits on charter amendments – to examine associations of target-firm management entrenchment measures with hedge fund investments.

We use the above data to study three hypotheses about reputation, based on (1) frequency of intervention, (2) past success, and (3) financial clout and expertise. First, we examine the *Most Active Hedge Funds*, defined as those with at least 5 interventions during the most recent previous 3-year period. That is, *Most Active Hedge Funds* in 2011 are those with at least 5 interventions during this period: 2008-2010. Second, we examine the *Top Return Hedge Funds*, defined as the ones with an average 21-day announcement period abnormal returns (over and above the CRSP value-weighted index) of at least 10% and with at least 3 interventions in rolling windows of past 3 years. We use the 21-day abnormal returns to include market reaction to anticipated involvement. Third, we examine the *Top Investor Hedge Funds*,

defined as the ones that are in the top 10 league table of aggregate dollar investments during the most recent previous 3-year period.

The pairwise correlations between *Top Investor Hedge Funds* and *Top Return Hedge fund* is 24.9%, between *Top Return Hedge Funds* and *Most Active Hedge Funds* is -8.3%, and between *Top Investor Hedge fund* and *Most Active Hedge Funds* is 36.7%. Thus, the three reputation measures are relatively different.

3. Examples

Many interventions by hedge fund activists have been widely covered in the media. For example, Pershing Square, a *Top Investor Hedge Fund* according to our reputation measure, has had many widely publicized successes, in terms of returns, resulting from investments in targets such as Longs Drugs Stores, Landry's Restaurant, and General Growth Properties.[3] Similarly high levels of publicity have surrounded several other *Top Investor Hedge Funds* according to our reputation measure, such as Carl Icahn, Relational Investors, Third Point, and Trian Fund, although in some high-profile incidents hedge fund activists have taken opposing positions (one of the most notable examples has been Herbalife Ltd., in which Carl Icahn and others held large long positions and Pershing Square held large short positions).

Much of our sample includes interventions that have not generated as much, or even any, media attention as the above interventions, but they nonetheless are useful representations of various aspects of our findings. They also indicate the varying degrees to which announcement period stock returns reflect anticipated actions by hedge funds, and the extent to which later stock price changes arise because of those actions, or for other reasons.

A. Potomac-PLX

In November 2012, Potomac Capital Partners L.P.[4] began purchasing common shares of PLX Technology, Inc., at prices in the range of $4 per share. Potomac and its affiliates continued to purchase shares of PLX through January 2013. On January 25, 2013, the Potomac affiliates filed a Schedule 13D disclosing that they had accumulated a 9.8% stake in PLX, and had sent an open letter to PLX's board stating the belief that, "management must immediately commence a

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[3] Pershing Square also has had widely publicized interventions that were much less successful.
[4] Potomac is a *Top Return Hedge fund* in terms of announcement period stock market reaction in our sample.

process of a thorough review of all strategic alternatives available to the Company and we do not believe that PLX should remain an independent public company." Potomac did not disclose in its filing the purchase or sale of any derivatives, including call or put options. The market reaction to the disclosure of Potomac's stake in PLX, and its activist intentions, was significantly positive. The 3-day, 7-day and 21-day announcement period abnormal market returns were 2.9%, 5%, and 18%, respectively.

During April 2013, Potomac representatives traveled to PLX to discuss a settlement proposal, including the formation of a new strategic review committee and two board seats, but were asked to sign a non-disclosure agreement and there apparently were no substantive discussions. On October 25, 2013, Potomac Capital sent an open letter to PLX's shareholders, stating that "the Board of Directors of PLX appears resistant to engaging in meaningful discussions with its largest stockholder in order to avoid an unnecessary election contest at the 2013 annual meeting." Ultimately, in June 2014, PLX agreed to be purchased by Avago Technologies in a cash deal valued at $6.50 per share. Avago completed its successful tender offer for more than 80% of PLX's shares on August 12, 2014.

B. Discovery Group-Horizon Pharma

In contrast, consider the August 13, 2012 Schedule 13D filing by Discovery Group I, LLC,[5] and its affiliates disclosing a 6.5% ownership stake in Horizon Pharma, Inc. Discovery Group disclosed that it purchased shares beginning in June 2012 and continued through August 10, 2012. The total purchase price was approximately $28 million, or an average price of approximately $5.86 per share. Discovery Group did not disclose in its filing the purchase or sale of any derivatives, including call or put options. Moreover, Discovery Group indicated that it did not have any current plans or proposals to change the board composition, sell the company, or otherwise seek major strategic or governance changes. The stock price of Horizon Pharma declined significantly as Discovery Group was purchasing its stake: its July 2012 purchases were at more than $7 per share; thereafter, the share price steadily declined. The 3-day, 7-day and 21-day announcement period abnormal market returns were significantly negative: -3%, -9% and -31% respectively.

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[5] Discovery is a *Most Active Hedge Fund* in our sample.

Discovery Group was a very active Schedule 13D filer during the mid-2012 time period, disclosing ownership stakes of greater than 5% in other companies, including: on May 4, 2012 for Keynote Systems Inc.; on May 11, 2012 for U.S. Auto Parts Network, Inc.; on July 19, 2012 for STR Holdings, Inc.; and on July 23, 2012 for Globecomm Systems Inc. Discovery Group also filed a Schedule 13D three days after it filed its Horizon Pharma Schedule 13D, disclosing a stake of 5.6% in Anaren, Inc.

Horizon Pharma ultimately performed well, primarily because of increased sales beginning in late 2013. Based on a search of media reports, it does not appear that Discovery Group publicly pressured or engaged Horizon Pharma's managers or directors; nor does it appear that Horizon Pharma changed its approach or strategy substantially in response to actions by Discovery Group. Horizon Pharma has never paid a dividend. Horizon Pharma did not experience any substantial changes in corporate governance or executive compensation during the relevant times. Timothy Walbert, who became CEO of the company in 2008 and chairman of the board in 2010, continued to serve in both capacities during the relevant times. Michael Grey served as lead independent director since August 2012, and served on the board since before Discovery Group disclosed its stake. On March 19, 2014, Discovery Group reduced its stake below the 5% threshold. The closing price of Horizon Pharma that date was $16.02.

4. Reputed Activists, Intervention Features, and Outcomes

A. Descriptive Statistics

Although some evidence, such as the data cited in Cheffins and Armour (2012), suggests that the number of hedge fund interventions declined between mid-2009 and early 2010, anecdotal evidence suggest that hedge fund activists continue to target publicly traded companies in high-profile interventions with reasonable regularity. We find similar evidence.

Table 1A reports annual descriptive statistics of our sample. We include the number of hedge fund interventions and various characteristics of target firms. Specifically, we report average total assets, average market capitalization, average return on assets, average book-to-market ratio, the proportion of Nasdaq-listed targets, and the percentage of targets that are finance firms (based on SIC codes in the range 60-67). The evidence shows that hedge fund activists are targeting larger firms on average than they have in the recent past. Targeted firms, on average, had assets of over $2 billion. We find an average market capitalization of $1.03

billion, similar to the $1.08 billion reported in Gantchev, Gredil and Jotikasthira (2014) for an overlapping sample period. By comparison, the average market capitalization reported by Brav, Jiang, Thomas, and Partnoy (2008) for 2001-2006 was much lower: $0.73 billion.

On average, the targets in our sample are not profitable. Our descriptive statistics suggest that activists generally are targeting firms that might need to improve their profitability and/or cash flows. Average return on assets is negative every year. We report an average return on assets of negative 6%, lower than the positive 1% found by Gantchev, Gredil and Jotikasthira (2014), and lower than the target return on assets in studies based on earlier sample periods, including target return on assets of 5% reported by Brav, Jiang, Thomas, and Partnoy (2008), and 2% reported by Bebchuk, Brav, and Jiang (2013). We report an average Tobin's Q (as proxied by the inverse of our book-to-market ratio) of 1.02, significantly less than the 1.99 reported by Gantchev, Gredil and Jotikasthira (2014) or the 1.54 reported by Brav, Jiang, Thomas, and Partnoy (2008). 65% of the targeted firms in our sample are listed on Nasdaq, and about one-fifth are in the financial sector.

Table 1B reports annual descriptive statistics of the mean announcement period abnormal market reaction (over and above the CRSP value-weighted returns) to intervention announcement, computed over 3 standard windows, (-1,+1), (-3,+3), and (-10,+10), the average percentage of shares held by the hedge fund on the first date that they publicly disclosed their investment, and the proportion of interventions that involved the use of call and put options. The average 21-day announcement period abnormal return is approximately 7.2%, a little more than the 21-day announcement period abnormal return of 6% reported by Bebchuk, Brav, and Jiang (2013), and similar to the 41-day announcement period abnormal return of 7% to 8% reported by Brav, Jiang, Thomas, and Partnoy (2008). The average abnormal market return is positive every year: investors generally seem to welcome activist interventions.

Some papers in the extant literature argue that the returns to activism have been declining over time. Brav, Jiang, Partnoy and Thomas (2008, at 35-36) find that as hedge fund activism became more common, the average abnormal returns at the filing of a Schedule 13D dropped, from 15.9% in 2001 to 3.4% in 2006; that study concludes that "[i]f activism is viewed as another form of arbitrage, then it is likely that the abnormal returns associated with hedge fund activism will decline, or even disappear, as more funds chase after fewer attractive targets, and as the market incorporates the potential for investor intervention and improvement into

security prices." Bratton (2010) finds some evidence to support this conclusion, showing that when the sample in Bratton (2007) is expanded to cover through mid-2009, the successes of the hedge fund activists are less robust. Gantchev, Gredil and Jotikasthira (2013) analyze 365 interventions through 2011, and report an average cumulative abnormal return of 5%, as compared to returns in the range of 7% for earlier periods. Drerup (2012), Katelouzou (2013), and Becht et al. (2014) are also more circumspect about the more recent success of hedge fund activism, particularly outside the U.S. However, we find that the announcement period abnormal returns around shareholder activism events continue to be robust, year after year.

The average shareholding as of the filing date, in our sample, is approximately 8.3%, consistent with studies of previous periods, which suggests that activists normally seek to avoid stakes of 10% or more, which would trigger certain costly legal and regulatory consequences.

We collect data on the disclosed use of call and put options by hedge fund activists. Although the use of derivatives in hedge fund activism has received much attention in the media and among academics, we find that the use of call and put options is relatively uncommon. Call and put options are mentioned in only 6.6% and 3.1% of all interventions, respectively. Moreover, the use of call and put options is not a significant independent variable in our regressions of the degree of market reaction to the announcement of intervention. One potential explanation for the dearth of options use is that hedge fund activists are able to achieve their objectives in accumulating their stakes – including secrecy, reliable trade execution, and low cost – by purchasing stock through reliable prime brokers. An alternative explanation is that hedge fund activists are using other transactions, including equity and total return swaps, instead of options, but hedge fund activists that engage in such transactions without disclosing them arguably are violating the applicable disclosure requirements.[6] In any event, the use of derivatives does not appear to be a statistically significant factor in the analysis of the returns to hedge fund activism.

B. Hedge Fund Reputation and Associations

Next, we examine the associations of reputed hedge funds with target firm and event features and market reaction to activism announcements.

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[6] See, e.g., CSX Corp. v. Children's Investment Fund Management (UK) LLP, 562 F.Supp.2d 511 (S.D.N.Y.2008), aff'd, CSX Corp. v. Children's Investment Fund Management (UK) LLP, 292 F. App'x 133, 133–34 (2d Cir.2008).

Our first reputation measure, *Most Active Hedge Funds,* is defined in terms of those with at least 5 interventions during the most recent previous 3-year period. For example, *Most Active Hedge Funds* in 2011 are those with at least 5 interventions during this period: 2008-2010. The list of *Most Active Hedge Funds*, the number of appearances in annual league tables, and the average annual market share (total market shares over all years of appearances in the annual *Most Active Hedge Funds* league tables, divided by 4) are as follows:

(1) Discovery Capital, 4, 3.39%;

(2) Bulldog Investors, 4, 3.18%;

(3) Starboard Capital (f.k.a. Ramius Group), 4, 2.74%;

(4) ValueAct Capital, 4, 1.93%;

(5) Carl Icahn, 4, 1.85%;

(6) GAMCO Investors, 4, 1.43%;

(7) Mill Road Capital, 4, 1.28%,

(8) Raging Capital, 4, 1.10%;

(9) Joseph Stilwell, 3, 2.34%;

(10) Western Investment, 3, 1.16%;

(11) Baker Street, 3, 0.92%;

(12) Relational Investors, 3, 0.91%;

(13) MMI Investments, 3, 0.88%;

(14) City of London Investment Group, 3, 0.86%;

(15) Elliott Associates, 3, 0.83%;

(16) Norman Pessin, 3, 0.83%;

(17) Lawrence Seidman, 3, 0.76%; and

(18) Clinton Group, 3, 0.74%.

Table 2A examines the univariate associations between the *Most Active Hedge Funds* and target firm characteristics, deal features, and market reaction, as compared to those of other hedge fund interventions. The sample period is 2011-2014. The market reaction to the announcement of intervention is significantly *lower* for the *Most Active Hedge Funds*, relative to the remainder of the sample. The *Most Active Hedge Funds* invest in significantly larger (measured in terms of market capitalization), and more profitable (measured by ROA), targets, as compared to other hedge funds. These target firms also have significantly lower book-to-market ratios (which is often used to determine a firm's lack of real options and is a proxy for (the inverse of) Tobins' Q) than other hedge funds.

This indicates that the *Most Active Hedge Funds* choose the better performing targets: those that are larger, more profitable and with better future prospects (a low book-to-market implies that a firm's stock is relatively more expensive than the replacement cost of its assets, which could imply investor optimism about a firm's real options). They also invest in fewer Nasdaq listed firms and more frequently in finance industry targets than other hedge funds.

Turning to our second reputation measure, overall, in our sample, the *Top Return Hedge Funds*, along with their average *CAR(-10,10)* are:

(1) Pershing Square, 24.5%

(2) Potomac Capital, 19.0%

(3) Red Oak Partners, 15.2%

(4) Jana Partners, 14.5%

(5) Baker Street Capital, 12.8%

(6) Timothy Stabosz, 12.2%

(7) Becker Drapkin Funds, 12.0%

(8) Norman Pessin, 11.9%

(9) Privet Fund, 11.7%

(10) Relational Investors, 11.7%

(11) Financial Edge Fund, 11.6%

(12) MMI Investments, 11.5%

(13) Wynnefield Partners, 11.3%, and

(14) Starboard, 11%.[7]

Table 2B reports the associations of *Top Return Hedge Funds* with target-firm and event features and market reaction to activism announcements. The 7-day and 21-day market reactions to the announcement of interventions are significantly higher for the *Top Return Hedge Funds*, but only at the 10% significance level, relative to the remainder of the sample; the 3-day return is not. The *Top Return Hedge Funds* invest in significantly larger (measured in terms of both total assets and market capitalization), as compared to other hedge funds. They favor finance firms and Nasdaq-listed firms significantly less than do other hedge funds.

Turning to our last reputation measure, Table 2C shows the associations of *Top Investor Hedge Funds* with target firm and deal features. The number of appearances in annual list of *Top*

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[7] In contrast, Discovery Group and Biotechnology Value Fund, for example, have average negative 21-day announcement period market reactions from their interventions.

Investor Hedge Funds, and the average annual dollar investment (total dollar investment as of the filing date, divided by 4) are as follows:

(1) Carl Icahn, 4, 5871.7;

(2) ValueAct Capital, 4, 3861.0;

(3) Jana Partners, 3, 2039.2;

(4) Pershing Square, 3, 1052.1;

(5) Relational Investors, 3, 1400.1;

(6) Southeastern Asset Management, 3, 1423.2;

(7) Third Point, 3, 1039.0;

(8) Trian Fund, 3, 1548.4;

(9) Elliott Associates, 2, 687.7; and

(10) Soroban Capital, 2, 1373.9.

Table 2C reports the average announcement period abnormal market returns, target firm characteristics, and deal features associated with *Top Investor Hedge Funds* interventions compared to those of other hedge fund interventions. *Top Investor Hedge Funds* invest in significantly larger (measured in terms of both total assets and market capitalization) and more profitable (measured by ROA) targets that also have significantly lower book-to-market ratios, as compared to other hedge funds. These indicate that the *Top Investor Hedge Funds* choose the better performing targets: those that are larger, more profitable and appear to have better future prospects. They also invest in fewer Nasdaq-listed than other hedge funds.

The announcement period abnormal market return is significantly higher (at the 5% or 1% significance level) for *Top Investor Hedge Funds* activism announcements, as compared to other hedge funds, irrespective of the announcement period window used, implying that the size of positions taken by hedge funds is viewed positively by the stock market. *Top Investor Hedge Funds* also target a significantly lower proportion of finance firms as compared to other firms

Thus, among the three alternative reputation measures we examined, the largest investor hedge funds are the ones that entail a significantly higher announcement period stock market abnormal returns (as compared to other hedge funds) across all three windows of announcement periods we examined: 3 days, 7 days and 21 day. In other words, the market seems to follow activists with financial clout, perhaps because they are perceived to be best

14

placed to create shareholder value in the firms they target. We next examine whether this result persists in a multivariate setting.

C. The Top Investor Hedge Funds

Table 3 examines the determinants of the announcement period abnormal market returns. It reports the regression coefficients, and the associated *t* statistics in parenthesis based on heteroskedasticity-consistent hedge-fund-clustered standard errors, of different specifications of the following regression explaining the announcement period abnormal market returns:

$$CAR = \beta_Y + \beta_I + \beta_1 \times \textit{Top Investor Hedge Funds} + \beta_2 \times \text{Market Cap} +$$
$$\beta_3 \times \text{ROA} + \beta_4 \times \text{Book to Market} + \beta_5 \times \text{Nasdaq-listing} + \beta_6 \times \text{Finance Firm} +$$
$$\beta_7 \times \text{Percentage of Shares Held on Filing Date} +$$
$$\beta_8 \times \text{Call Option} + \beta_9 \times \text{Put Option} + \varepsilon , \tag{1}$$

where *CAR* is either the 3-day value-weighted-market-adjusted abnormal announcement period stock return, *CAR(-1,+1)*, or the 7-day return, CAR (-3,+3), or the 21-day period return, *CAR (-10,+10)*.

Top Investor Hedge Funds are the ones are those in the top 10 league tables based on aggregate investments in immediate past 3 year rolling windows, so as to be free of any look-ahead bias, β_Y is a vector of 7 year fixed effects, and β_I is a vector of 10 bidder industry fixed effects, based on Fama-French industry sectors. These fixed effects are used to capture any year- or industry-related common effects not specifically captured by the other explanatory variables. The explanatory variables and residuals from the above panel regression specification (1) can be correlated within hedge funds. To correct for such hedge fund-specific correlations, we report *t*-statistics that are based on heteroskedasticity-consistent standard errors adjusted for hedge-fund clustering in all the regressions (see Petersen 2009).

The sample period over which the regression is run is 2011-2014, where the period 2008-2010 is used to construct the initial *Top Investor Hedge Funds* reputation measure. Two different specifications are run, with and without the deal features - *Percentage of Shares Held on Filing Date*, *Call Option*, and *Put Option* – which may not be known at the time announcement period abnormal market reaction is determined.

Table 3A results confirm our earlier conclusion from the univariate analysis. *Top Investor Hedge Funds* are strongly associated with significantly higher stock market reactions, across all the specifications examined, when they announce their intervention. All specifications also show that the target firm market capitalization is significantly and negatively associated with announcement period market reaction. Moreover, investment by activists in finance firms is not associated with positive announcement returns. Target ROA is positively and significantly associated with announcement period market reaction, when we examine the 7-day returns; the target book-to-market ratio is positively and significantly associated with announcement period market reaction, when we examine longer-window returns. Overall, results indicate that market reaction is more positive when targets are not large, not financial firms, are currently profitable, but appear to have worse future cash flow prospects. Taken together, the results of Tables 2 and 3 show that frequent intervention does not lead to superior market reaction, but large investments do.

When we examine regression specification 1 results using *Top Return Hedge Funds* as the main explanatory variable, we find that *Top Return Hedge Funds* are not significantly associated with higher *CAR(-1,+1)* or *CAR(-3,+3)*, but is significantly associated with a higher *CAR(-10,+10)* at the 10% significance level (results reported in Table 3B). These results confirm that the stock market is most excited about large investor hedge fund activism events.

Although we control for target firm features, deal features, and fixed effects in the above regression specification, it is still possible that *Top Investor Hedge Funds* are associated with specific activism outcomes simply because they are associated with certain types of targeted firms, in which such outcomes are more likely. In other words, associations between top hedge fund involvement and success can be complicated by a top hedge fund's unobserved criteria for involvement in a target firm. To control for this form of selection bias, we employ an instrumental variable (IV) simultaneous equations regression model over our full sample, using limited information maximum likelihood (LIML) estimation (see Juergens and Lindsey, 2009), where *Top Investor Hedge Funds* is the endogenous covariate.

To be a valid IV, it should have the properties that while it strongly predicts the involvement of *Top Investor Hedge Funds* in activism events being examined, it should not be significantly associated with the outcomes of activism except through the *Top Investor Hedge Fund* itself. We use the 2-vector of Instrumental Variables (IVs) all taken from Activist Insight

database - *Assets Under Management*, a hedge fund firm's total assets under management (in millions of dollars) as at the end of the year immediately preceding the year of announcement, and *Number of Portfolio Companies,* a hedge fund firm's number of firms in portfolio as at the end of the year immediately preceding the year of announcement. These are the 2 proxies for the financial "clout and expertise" that enable *Top Investor Hedge Funds* to choose target firms, and thus facilitate the hedge fund-target firm matching process.

The Activist Insight hedge fund data spans the years 2010, 2011, 2012, 2013, and 2014. We link 2010 numbers from Activist Insight to the announcements made in 2011 to avoid any look-ahead bias. Likewise, we link 2011, 2012 and 2013 hedge-fund features with shareholder activism events in 2012, 2013 and 2014 respectively. We end up with 412 shareholder activism events over the period 2011-2014 with all IV data, for analysis.

Economically, the choice of these IVs is justified because the higher a hedge fund firm's total assets under management, the higher the probability of investing in the firms it wants, especially in taking a more than 5% stake in large capitalization target firms. An alternative measure of a hedge fund's clout and ability to invest is the number of firms in its portfolio. These two IVs satisfy the exclusion requirement because while a hedge fund's financial clout as measured by the amount of capital and number of firms invested in, at the time of announcement, facilitates the matching of hedge fund to a target firm, it does not directly ensure superior performance in its current investment, except through the hedge fund itself.

We examine the statistical validity of the instruments by performing over-identification tests (see, e.g., Krishnan et al. 2012, 2014). The first column of Table 4A reports the first stage regression estimates, and shows that *Top Investor Hedge Funds* is significantly and positively associated with both *Assets Under Management* and *Number of Portfolio Companies* at the 1% level. The *F*-statistic for the joint significance of both IVs for *Top Investor Hedge Funds* is above the critical value of 10 recommended by Staiger and Stock (1997). Thus, the set of IVs strongly predict a *Top Investor Hedge Fund* involvement with the target firm. However, the *Anderson-Rubin* test statistic for over-identification yields insignificant *p*-values for *CAR(-1+1)* and *CAR(-10+10)*, after controlling for other offer characteristics including *Top Investor Hedge Funds*. So we fail to reject the joint null that the IVs are uncorrelated with the error term, which supports excluding them from the second-stage equation. We conclude that our IVs satisfy the exclusion requirement of a valid instrument.

The remaining columns of Table 4A report the associations between *Top Investor Hedge Funds* and announcement period abnormal stock returns, after instrumenting for unobserved firm quality. All hedge fund features are as of the year-end immediately prior to the intervention, so as to be free of any look-ahead bias. The sample period is 2011-2014. The positive associations of *Top Investor Hedge Funds* with higher stock market reactions, across all windows examined, are stronger than those reported in Table 3A. All specifications also show that the target firm market capitalization is significantly and negatively associated with announcement period market reaction. Moreover, investment by activists in finance firms is not associated with positive announcement returns. However, target firm's book-to-market ratio and target ROA are no longer significantly associated with announcement period market reaction.

We check our results of Table 3A using an alternative estimation procedure. Table 4B reports results of 2-stage Least Squares (2SLS) estimation procedure explaining *CAR*, using the 2-vector of IVs: *Assets Under Management* and *Number of Portfolio Companies*.[8] *Top Investor Hedge Funds* are again significantly and positively associated with *CAR(-1,+1)*, *CAR(-3,+3)* and *CAR(-10,+10)*.

Table A2 is the Appendix reports the results when we examine top investor hedge fund market shares, a continuous variable, rather than the binary *Top Investor Hedge Funds* reputation measure. We find that *Hedge Fund Investment Market Share* is associated with the 3-day abnormal announcement period return at the 5% significance level, with the 7-day abnormal announcement period return only at the 10% significance level, and not significantly associated with the 21-day abnormal announcement period return. Thus, whether a hedge fund is in the top 10 league table of aggregate dollar investments matters significantly, the continuous market share variable is much less significantly associated with market reaction to activism events.

D. Features of Top Investor Hedge Funds

What are the features of *Top Investor Hedge Funds?* Table 5 shows that, across all dimensions we examine, *Top Investor Hedge Funds* are larger, more active, and have existed for longer than other hedge funds. The number of years the hedge fund activist has been in

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[8] There is no a-priori reason to believe that 2SLS estimator is superior to LIML's; there has been some debate in the literature (see, e.g., Blomquist and Dahlberg, 1999). Nevertheless, it is useful to check the main result using a different IV estimation strategy.

existence, the number of top management personnel, the dollar of assets under management, the number of portfolio companies, and the number of portfolio companies in which the hedge fund activist holds at least one board seat are all significantly higher for *Top Investor Hedge Funds*, as compared to other hedge funds. These funds are also headquartered significantly more in New York than the other hedge funds, even if they are incorporated elsewhere. The focus on New York appears to reflect the importance to hedge funds of their physical location, perhaps because of proximity to investors, media, top law firms, or other hedge funds.

E. Entrenchment in Targets of Top Investor Hedge Funds

It would be interesting to see whether the degree of management entrenchment matters to hedge funds when they target firms for shareholder activism. Entrenchment can lead to shirking, empire-building, and extraction of private benefits by management, and, for these reasons, these are the firms in which an activist shareholder can create value. Alternatively, *Top Investor Hedge Funds* may not choose targets with strongly entrenched management for fear of intervention failure. A third viewpoint could be that anti-takeover provisions do not matter for top activists because they do not affect their success rates.

Bebchuk, Cohen, and Ferrell (2009) calculate an entrenchment index based on six provisions: staggered boards, limits on shareholder bylaw amendments, poison pills, golden parachutes, supermajority voting requirements for mergers, and limits on charter amendments. We use Investor Responsibility Research Center (IRRC) data to examine the associations of these target firm features and our measures of hedge fund pedigree. We determine the presence or absence of each of the 6 IRRC provisions at each targeted firm as at the end of the year immediately preceding that of the shareholder activism announcement. We could find IRRC data for only 178 target firms from out of our sample of 947 different target firms. Table 6 reports univariate associations of these 6 anti-takeover provisions of targets with *Top Investor Hedge Funds*. Almost all of these entrenchment measures are more prevalent at firms targeted by *Top Investor Hedge Fund* targets than at firms targeted by other hedge funds, but almost always not significantly so. Thus, although the sample size in this analysis is small, anti-takeover provisions do not appear to matter for top activists.

When we aggregate these six entrenchment provisions into one entrenchment index (see Bebchuk, Cohen, and Ferrell (2009)), we find that the *Top Investor Hedge Funds* target firms with significantly (at the 10% level) more entrenched management than do other hedge funds.

F. Top Investor Hedge Funds and Post-Activism Performance of Targets

How do operating performances of target firms change from before the intervention to after the intervention? In Table 7A, we compare Return on Assets (ROA), Sales Revenue, and R&D investment growth from pre-announcement to post-announcement, for *Top Investor Hedge Funds*, as compared with the remaining hedge funds. ROA growth, Sales growth, and R&D investment growth rates are computed as the growth rate from the average of the 4 quarters immediately prior to the hedge fund intervention to the average of the 4 quarters immediately after intervention, for *Top Investor Hedge Funds* as compared with other hedge funds. There is a positive and statistically significant (at the 10% level) difference for all 3 measures between targets backed by *Top Investor Hedge Funds* and those backed by all other hedge funds. Indeed, all 3 growth rates are negative for non-top investor hedge fund interventions. These values suggest that *Top Investor Hedge Funds* are better than other funds at stimulating an immediate operational performance improvement at the companies they target.

In Panel B, we compare the proportion of target firms that are delisted within five years of the hedge funds' initial announcement of their stake in the firm for *Top Investor Hedge Funds* and all other hedge funds. We examine two different types of delisting: delisting because of liquidations and being dropped (CRSP delisting codes of 400 and above), and delisting because of mergers and acquisitions (CRSP delisting codes between 200 and 300). We report that the proportion of target firms delisted because of liquidation or being dropped is significantly higher for the non-top investor hedge fund interventions. Indeed, this proportion is zero for targets backed by *Top Investor Hedge Funds*. The proportion of delistings because of acquisitions is also higher for targets invested in by *Top Investor Hedge Funds* than for targets invested in by other hedge funds, providing some evidence that the positive returns that all hedge funds generate for their investors are also potentially due to their ability to bring about sales of these target firms, consistent with Greenwood and Schor (2009).[9] However, this difference is not

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[9] Anecdotal evidence suggests that the hedge fund activists with the largest investments overall are associated more with efforts that would result in delisting because of mergers and acquisitions than efforts that would result in delisting because of liquidations and being dropped. For example, Bill

significantly different at the 10% level. But, keeping in mind the results of Table 6, to the extent target management entrenchment provisions reduce the likelihood that the target firm will be sold or otherwise reduce shareholder value, those reductions do not seem to matter substantially to the market reactions to the announcement of top activist interventions, perhaps because the operating performance of target firms tend to improve.

Overall, univariate results suggest that top hedge fund activists generate superior returns both by improving operating performance as well as by increasing the probability of a later sale. However, after controlling for other target firm features, we find that only the difference in R&D investments and delisting because of liquidations and being dropped continue to be statistically significant for targets invested in by top hedge funds. These multivariate regression results are presented in Panel C.

G. Examining Potential Explanations for Results

In this final section, we seek explanations for *Top Investor Hedge Funds* market following and success. The literature has alluded to some reasons for the apparent success of hedge fund activists, at least through 2007, which include potentially superior alignment of incentives for hedge fund managers, activists facing less serious political pressure, agency costs, and conflicts of interest than other investors (Partnoy, 2015), and reduction of excess cash at the hands of management, perhaps through changes in firm's leverage, or payouts to shareholders (Brav, Jiang and Kim, 2010).

We examine whether long term debt ratio or payout ratio change from the average over 4 quarters before activism event to the average over 4 quarters after the event in firms targeting by top hedge funds. Following Heider and Ljungqvist (2015), long term debt ratio is defined as long-term debt over the book value of assets, and following Grullon and Michaely (2002), dividend payout ratio is defined as dividend on common stock over earnings before extraordinary items. Table 8A compares these two growth ratios for reputed hedge funds, according to our three hedge fund reputation measures, with those for the other hedge funds. We find that although these two ratios are indeed higher in the post intervention period for

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Ackman's Pershing Square hired Stephen Fraidin, a veteran M&A lawyer of Kirkland and Ellis law firm (see *Wall Street Journal*, Jan 20, 2015); and many activists have encouraged split-ups, such as Carl Icahn proposing the split-up of Ebay from PayPal, making both attractive acquisition targets (see *Wall Street Journal*, Jan 22, 2015).

firms targeted by *Top Investor Hedge Funds*, these differences are not significant compared to those for firms targeted by other hedge funds. The only significant different is in the dividend payout ratio growth rate for *Top Return Hedge Funds* as compared to other hedge funds.

Thus, *Top Investor Hedge Funds* do not seem to be making the difference through significant changes in capital structure or dividend policy. Krishnan, Ivanov, Masulis and Singh (2011) report that reputed Venture Capital Firms remain shareholders and hold board positions even well into the post-IPO period, to continue to offer monitoring and guidance services to the portfolio firms. In a similar vein, we first examine the stated intent of hedge funds in their 13D filings, and their subsequent actions. In particular, we define *Director Replacement Intent* as an indicator variable that takes the value of 1 if the hedge fund intervention is with the stated objective (in 13D) that includes language about replacing one or more directors, and 0 otherwise. Table 8B compares *Director Replacement Intent* for reputed hedge funds, according to our three hedge fund reputation measures, with those for the other hedge funds. We find that *Director Replacement Intent* is significantly higher only for *Top Investor Hedge Funds* than for other hedge funds. That is, the largest investors, show board involvement intent.

To examine whether they follow up on their stated intent, we examine proportions of *Proxy Contests*, and *Proxy Contests Won* by the dissident, in target firms invested in by reputed hedge funds, as compared to those for other hedge funds. However, we could find only 22 proxy contests for our sample of activist events in the period 2011-2014, which precludes any meaningful statistical analysis. However, it is worth noting that of these 22 events, 13 involve Carl Icahn (*Most Active* and *Top Investor*), Starboard (*Most Active* and *Top Return* hedge fund), Potomac (*Top Return* hedge fund), and Third Point (*Top Investor*), of which 11 were won by the dissident.

5. Conclusions

We find several important results about hedge fund activism. Contrary to some earlier evidence, the announcement of interventions by hedge fund activists continues to be associated with positive announcement period abnormal stock returns. What is the source of these extraordinary market returns? To investigate that question, we explore the extent to which returns vary based on the activists' reputations. Specifically, we examine three measures of

hedge fund reputation, constructed free of look-ahead bias, based on (1) frequency of intervention, (2) past success, and (3) financial clout and expertise.

Testing each of these potential explanations, we find that hedge fund activists that engage in the largest numbers of interventions (frequency of intervention measure) are associated with lower returns, suggesting the perception that highly active funds will be less able to engage meaningfully in each of their interventions, whereas activists that had superior announcement period market reactions in the recent past (past success measure) generate smaller returns. In contrast, hedge fund activists that make large dollar investments (financial clout and expertise measure) are associated with significantly higher announcement period returns and improved post-intervention operating performance, suggesting that those firms that have the capacity and willingness to engage in large investments are bigger and more able to engage meaningfully in each of their interventions. This result holds even after instrumenting for unobserved quality, given that top activists may intervene in better firms with higher chances of success.

Hedge funds that make bigger investments tend have significantly larger amount of assets under management, and larger numbers of portfolio companies, as compared to other hedge funds. They also have significantly larger numbers of portfolio companies in which they hold board seats, as compared to other hedge funds. Indeed, returns to investments are significantly higher for hedge funds that have been in existence for longer periods of time, and have a track record of holding more board seats. They tend to invest in targets with the specifically stated intent of making board changes. The largest investors also tend to target firms with that have more entrenched management. However, to the extent entrenchment provisions reduce the likelihood that a target will be sold or otherwise reduce shareholder value, those reductions appear to be more than compensated for by top (largest) investor hedge fund ability to enhance operating performance post-intervention, on average, as the overall positive market reactions to the announcement of such activist interventions indicate.

In sum, the questions raised by Brav, Jiang, Partnoy, and Thomas (2008) have interesting, and perhaps surprising, answers based on more recent data. The returns to hedge fund activism overall have not declined, as the data in that original study suggested they might. Instead, those returns remain high on average, even as the market has expanded and diversified. However, the relative success of activists has varied in recent years. We develop a

hedge fund reputation measure based on the aggregate amount of investments in the recent past. Significantly higher announcement period stock returns as well as post-announcement operating performance are associated with the most reputed hedge funds. The associations between alternative hedge fund reputation measures and announcement period market reaction are weaker than those of this hedge fund reputation measure.

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Table 1
Descriptive Statistics of Hedge Fund Interventions

Panel A shows the year-by-year number of interventions, and target firm characteristics. The average total assets, the average market capitalization (market value of equity), the average profitability (measured by Return on Assets), the average book-to-market value of equity ratio, the proportions of Nasdaq-listed targets, and finance-firm targets are reported. Panel B reports the mean announcement period abnormal market reaction to interventions computed over 3 different periods, the average percentage of shares held by the hedge fund as on the filing date, and the proportion of interventions that entailed call and put options. All variables are defined in Table A1 in Appendix.

Panel A

Year	N	Average Assets	Average Market Cap	Average ROA	Average Book to Market	Proportion Nasdaq listing	Proportion Finance Target
2008	242	3356.5	1159.2	-0.05	0.94	66.11%	17.77%
2009	124	1117.3	286.8	-0.17	1.49	66.13%	25.80%
2010	156	1236.7	674.9	-0.13	0.74	66.02%	17.95%
2011	165	1874.3	1106.2	-0.01	0.91	68.48%	18.18%
2012	146	2118.7	1207.6	-0.01	1.04	66.43%	13.69%
2013	135	2898.2	1623.2	-0.04	0.96	57.04%	21.48%
2014	35	1758.6	1106.3	-0.04	0.78	62.85%	17.14%
All	1003	2219.4	1033.9	-0.06	0.98	65.20%	18.74%

Year	N	Average CAR(-1+1)	Average CAR(-3,+3)	Average CAR (-10,+10)	Average Percentage of Shares Held on Filing Date	Proportion of Events with Call Options	Proportion of Events with Put Options
2008	242	3.01%	4.17%	5.09%	8.48	5.37%	1.23%
2009	124	3.44%	4.83%	12.38%	7.38	7.32%	3.22%
2010	156	2.49%	3.29%	5.95%	9.08	5.13%	3.85%
2011	165	3.40%	2.58%	4.30%	8.27	5.49%	4.27%
2012	146	2.16%	3.91%	8.27%	8.10	10.96%	6.16%
2013	135	4.22%	5.37%	10.04%	7.90	5.93%	1.48%
2014	35	0.01%	0.16%	0.22%	8.23	8.57%	0.00%
All	1003	3.06%	3.95%	7.17%	8.26	6.59%	3.09%

Table 2

Hedge Fund Reputation, Target and Deal Features, and Market Reaction

This table reports the average announcement period abnormal market returns, the average target firm characteristics, and the average deal features associated with the reputed Hedge fund interventions, compared to those of other hedge fund interventions. Reputed hedge funds are, alternatively, defined as *Most Active Hedge Funds*, *Top Return Hedge Funds*, and *Top Investor Hedge Funds*. The sample period is 2011-2014. All variables are defined in Table A1 in Appendix

Panel A

Feature	*Most Active Hedge Funds*	Other Hedge Funds
	N= 145	N= 336
Average CAR(-1+1)	2.41%	3.54%*
Average CAR(-3+3)	3.09%	4.17%
Average CAR(-10+10)	5.98%	7.90%*
Average Percentage of Shares Held on Filing Date	7.73%	8.28%
Average Assets	2645.6	2063.2
Average Market Cap	1565.2	1165.6*
Average ROA	0.00	-0.03*
Average Book to Market	0.70	1.04***
Proportion Nasdaq-listing	59.31%	66.37%*
Proportion Finance Firms	26.89%	13.69%***
Proportion of Events with Call Options	7.59%	7.46%
Proportion of Events with Put Options	4.14%	3.58%

*, **, and *** denotes significantly different from the other cohort at the 10%, 5%, and 1% significance levels.

Panel B

Feature	Top Return Hedge Funds	Other Hedge Funds
	N = 69	N= 412
Average CAR(-1+1)	3.47%	3.13%
Average CAR(-3+3)	6.02%	3.45%*
Average CAR(-10+10)	10.63%	6.72%*
Average Percentage of Shares Held on Filing Date	8.55%	8.04%
Average Assets	4221.9	1882.1***
Average Market Cap	2372.4	1102.3***
Average ROA	-0.01	-0.02
Average Book to Market	0.87	0.95
Proportion Nasdaq-listed Targets	55.07%	65.77%*
Proportion Finance Target	5.80%	19.66%***
Proportion of Events with Call Options	2.90%	8.28%
Proportion of Events with Put Options	2.90%	3.89%

*, **, and *** denotes significantly different from the other cohort at the 10%, 5%, and 1% significance levels.

Panel C

Feature	*Top Investor Hedge Funds*	Other Hedge Funds
	N= 54	N=427
Average CAR(-1+1)	4.85%	2.95%**
Average CAR(-3+3)	7.42%	3.36%***
Average CAR(-10+10)	12.43%	6.60%**
Average Percentage of Shares Held on Filing Date	7.83%	8.15%
Average Assets	9785.9	1262.7***
Average Market Cap	6523.9	624.9***
Average ROA	0.07	-0.03***
Average Book to Market	0.60	0.98***
Proportion Nasdaq-listing	27.77%	68.85%***
Proportion Finance Firms	7.41%	18.97%**
Proportion of Events with Call Options	9.25%	7.27%
Proportion of Events with Put Options	5.55%	3.52%

*, **, and *** denotes significantly different from the other cohort at the 10%, 5%, and 1% significance levels.

Table 3
Top Investor Hedge Funds and Market Reaction

The table reports the regression coefficients, and the associated *t* statistics in parenthesis based on heteroskedasticity-consistent Hedge fund-clustered standard errors, of regressions explaining the announcement period abnormal market returns. The sample period is 2011-2014. *Top Investor Hedge Funds* are those in the top 10 league tables based on aggregate investments in immediate past 3 year rolling windows, thus free of any look-ahead bias. *Top Return Hedge Funds are* those with average 21-day announcement period abnormal returns (over and above the CRSP value-weighted index) of at least 10% and with at least 3 interventions in rolling windows of past 3 years. Also reported are Adjusted R^2 values. Included in the regressions as controls are β_Y, a vector of year fixed effects, and β_I, a vector of bidder industry fixed effects based on the 10 Fama-French industry classifications. All variables are defined in Table A1 of Appendix.

Panel A

	CAR(-1+1)		CAR(-3+3)		CAR(-10+10)	
Top Investor Hedge Fund	0.02***	0.03**	0.06***	0.05***	0.12***	0.11***
	(2.60)	(2.37)	(3.41)	(3.15)	(3.77)	(3.59)
Market Cap	-0.01**	-0.01**	-0.01***	-0.01***	-0.01***	-0.01***
	(-2.43)	(-2.22)	(-3.59)	(-3.23)	(-3.78)	(-3.51)
ROA	0.02	0.02	0.06***	0.06***	0.06	0.06
	(1.33)	(1.36)	(3.13)	(3.20)	(1.34)	(1.39)
Book to Market	0.01*	0.01*	0.01	0.01	0.03***	0.03***
	(1.67)	(1.65)	(1.44)	(1.38)	(2.65)	(2.56)
Nasdaq-listing	0.00	0.01	0.01	0.01	0.02	0.02
	(0.25)	(0.21)	(0.45)	(0.39)	(1.21)	(1.19)
Finance Firm	-0.03***	-0.02***	-0.03***	-0.03***	-0.03**	-0.03**
	(-4.46)	(-4.40)	(-3.64)	(-3.43)	(-2.26)	(-2.08)
Percentage of Shares Held on Filing Date		0.01		0.01		0.01
		(0.10)		(0.38)		(1.17)
Call Option		0.01		0.02		0.01
		(0.34)		(0.68)		(0.33)
Put Option		0.02		0.03		0.04
		(0.57)		(0.79)		(0.74)
β_Y	Yes	Yes	Yes	Yes	Yes	Yes
β_I	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	9.26	11.47	8.94	9.69	10.97	12.51

*, **, and *** denotes significantly different from zero at the 10%, 5%, and 1% significance levels.

Panel B

	CAR(-1+1)		CAR(-3+3)		CAR(-10+10)	
Top Return Hedge Fund	0.02 (0.28)	0.01 (0.24)	0.02 (1.88)	0.02 (1.86)	0.04* (1.93)	0.04* (1.94)
Market Cap	-0.01 (-1.20)	-0.01 (-1.08)	-0.01 (-1.40)	-0.01 (-1.15)	-0.01* (-1.85)	-0.01 (-1.61)
ROA	0.02 (1.59)	0.02 (1.60)	0.07*** (3.45)	0.07*** (3.50)	0.07* (1.64)	0.07* (1.69)
Book to Market	0.01 (1.54)	0.01 (1.52)	0.01 (1.31)	0.01 (1.26)	0.03** (2.48)	0.03** (2.42)
Nasdaq-listing	0.00 (0.02)	0.00 (0.06)	0.00 (0.24)	0.00 (0.18)	0.02 (0.94)	0.02 (0.91)
Finance Firm	-0.03*** (-4.56)	-0.03*** (-4.47)	-0.03*** (-3.39)	-0.03*** (-3.15)	-0.03** (-2.03)	-0.03* (-1.84)
Percentage of Shares Held on Filing Date		0.00 (0.05)		0.00 (0.40)		0.01 (1.19)
Call Option		0.01 (0.42)		0.02 (0.83)		0.03 (0.52)
Put Option		0.01 (0.70)		0.03 (0.83)		0.04 (0.83)
β_Y	Yes	Yes	Yes	Yes	Yes	Yes
β_I	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	8.04	9.41	8.59	9.67	8.64	9.49

*, **, and *** denotes significantly different from zero at the 10%, 5%, and 1% significance levels.

Table 4
Top Investor Hedge Funds and Market Reaction, After Controlling for Endogeneity

Panel A reports the regression coefficients, and the associated *t* statistics of regressions explaining the announcement period abnormal market returns employing an instrumental variable (IV) simultaneous equations regression model using limited information maximum likelihood (LIML) estimation, where *Top Investor Hedge Fund*, determined without any look-ahead bias, is the endogenous covariate. The IVs are *Assets under Management,* and *Number of Portfolio Companies.* The first column shows the first stage regression estimates. All hedge fund features are as of the year-end immediately prior to the intervention, so as to be free of any look-ahead bias. The sample period is 2011-2014. Panel B reports results using 2-stage Least Squares (2SLS) estimation procedure, with the same 2-vecstor of IVs, explaining CARs.

Panel A

	1st Stage	CAR(-1+1)	CAR(-3+3)	CAR(-10+10)
Top Investor Hedge Fund		0.04***	0.06***	0.14***
		(3.08)	(3.73)	(4.24)
Assets under Management	0.01***			
	(2.58)			
Number of Portfolio Companies	0.12***			
	(3.83)			
Market Cap	0.01***	-0.01**	-0.01***	-0.01***
	(3.52)	(-2.36)	(-3.84)	(-3.48)
ROA	4.66***	0.01	0.04	0.02
	(2.90)	(0.40)	(1.33)	(0.34)
Book to Market	-0.27	0.01	0.01	0.02
	(-0.99)	(0.69)	(0.89)	(1.48)
Nasdaq-listing	-0.97*	0.01	0.01	0.03*
	(-1.79)	(1.50)	(0.97)	(1.68)
Finance Firm	-0.81	-0.02***	-0.03***	-0.02**
	(-1.23)	(-2.71)	(-3.17)	(-2.02)
β_Y		Yes	Yes	Yes
β_I		Yes	Yes	Yes
Pseudo/Adjusted R^2	56.05	10.74	10.40	11.83

*, **, and *** denotes significantly different from zero at the 10%, 5%, and 1% significance levels.

Panel B

	CAR(-1+1)	CAR(-3+3)	CAR(-10+10)
Top Investor Hedge Fund	0.04***	0.06***	0.14***
	(2.87)	(3.50)	(4.23)
Market Cap	-0.01**	-0.01***	-0.01***
	(-2.30)	(-3.84)	(-3.58)
ROA	0.01	0.04	0.02
	(0.68)	(1.29)	(0.57)
Book to Market	0.01	0.01	0.02
	(0.68)	(0.93)	(1.55)
Nasdaq-listing	0.01*	0.01	0.03**
	(1.75)	(1.13)	(2.38)
Finance Firm	-0.02***	-0.03***	-0.02**
	(-2.72)	(-3.68)	(-2.39)
β_Y	Yes	Yes	Yes
β_I	Yes	Yes	Yes
Adjusted R^2	10.59	11.39	12.66

*, **, and *** denotes significantly different from zero at the 10%, 5%, and 1% significance levels.

Table 5
Top Investor Hedge Funds Features

This table compares average firm features (averaged over years) of *Top Investor Hedge Funds*, based on the dollar amount of investments over our full sample period, with other Hedge Funds. Hedge Fund firm features are provided by Activist Insight Ltd. All variables are defined in Table A1 in Appendix.

Average Hedge Firm Features	Top Investor Hedge Funds	Other Hedge Funds
	N= 11	N= 214
Firm Incorporated in NY State	72.72%	37.26%**
Firm Age (Years)	18.64	13.34*
Top Management Number	4.93	3.59*
Assets Under Management ($ million)	13837.9	4145.9***
Number of Portfolio Companies	13	3.98***
Number of Portfolio Companies in which Board Seats Held	1.64	0.60***

*, **, and *** denotes significantly different from zero at the 10%, 5%, and 1% significance levels.

Table 6
Management Entrenchment in Target Firms

This table reports the associations between 6 anti-takeover provisions and *Top Investor Hedge Fund* and other hedge funds. The 6 provisions are: staggered boards, limits on shareholder bylaw amendments, poison pills, golden parachutes, supermajority voting requirements for mergers, and limits on charter amendments, taken from Investor Responsibility Research Center (IRRC) as of the end of the year immediately prior to the year of shareholder activism announcement. The proportions of firms having these provisions, targeted by each type of hedge fund, are shown. Also shown are average aggregate entrenchment measure, proportion of hostile activism events and post-activism acquisitions of firms, targeted by *Top Investor Hedge Fund* as compared with other hedge funds. The sample period is 2008-2014.

IRRC Provision Proportion	*Top Investor Hedge Funds*	Other Hedge Funds
	N= 53	N=125
Staggered Board	0.64	0.51*
Poison Pill	0.40	0.33
Golden Parachute	0.66	0.61
Limit on bylaw amendments	0.74	0.64
Supermajority requirement for mergers	0.42	0.46
Limits on charter amendments	0.70	0.62
Aggregate Entrenchment Measure	3.55	3.16*

*, **, and *** denotes significantly different from zero at the 10%, 5%, and 1% significance levels.

Table 7
Post- Top Investor Hedge Fund Intervention

Panel A compares the post-intervention ROA, Sales, and R&D Investment growth rate, computed as the growth rate from average ROA, Sales, and R&D Investment over the 4 quarters immediately prior to the hedge fund intervention to the averages over the 4 quarters immediately after intervention, for *Top Investor Hedge Funds* as compared with other hedge funds. Panel B reports target firm delisting proportions due to mergers and acquisitions or liquidations for *Top Investor Hedge Funds* as compared with other hedge funds. Panel C examines these operation performance changes in a multivariate setting. Panel D reports change in long term debt ratio and Payout ratios computed as the change from average numbers over the 4 quarters immediately prior to the hedge fund intervention to the averages over the 4 quarters immediately after intervention, for *Top Investor Hedge Funds* as compared with other hedge funds. All variables are defined in Table A1 of Appendix.

Panel A: Post-Intervention Performance

	Top Investor Hedge Funds	Other Hedge Funds
	N= 51	N=396
ROA Growth	9.24%	-4.74%*
Sales Growth	2.54%	-3.00%*
R&D Investment Growth	3.42%	-0.47%*

Panel B: Post-Intervention Delisting

	Top Investor Hedge Funds	Other Hedge Funds
	N= 54	N=427
Proportion Acquired and delisted	16.67%	12.88%
Proportion Liquidated/dropped and delisted	0.00%	4.68%**

*, **, and *** denotes significantly different from zero at the 10%, 5%, and 1% significance levels.

	ROA Growth	Sales Growth	R&D Investment Growth	Proportion Liquidated/dropped and delisted
Top Investor Hedge Fund	0.22 (0.52)	0.01 (0.37)	0.05* (1.70)	-0.03* (-1.81)
Market Cap	0.06 (0.18)	0.01 (0.03)	-0.01 (-1.04)	-0.01 (-0.59)
ROA	-0.13 (-0.26)	0.07 (0.60)	0.01 (0.26)	-0.05* (-1.65)
Book to Market	0.15 (0.80)	-0.03* (-1.64)	0.01 (0.65)	0.05*** (2.56)
Nasdaq-listing	0.71* (1.75)	-0.01 (-0.18)	0.01 (0.49)	0.01 (0.67)
Finance Firm	-0.11 (-0.27)	-0.17 (-0.90)	-0.01 (-1.04)	-0.03 (-1.41)
β_Y	Yes	Yes	Yes	Yes
β_I	Yes	Yes	Yes	Yes
Adjusted R^2	4.84	4.13	5.35	9.71

*, **, and *** denotes significantly different from zero at the 10%, 5%, and 1% significance levels.

Table 8
Potential Explanations for Top Investor Hedge Fund Success

Panel A reports change in long term debt ratio and Payout ratios computed as the change from average numbers over the 4 quarters immediately prior to the hedge fund intervention to the averages over the 4 quarters immediately after intervention, and Panel B reports *Director Replacement Intent* for reputed hedge funds as compared with other hedge funds. All variables are defined in Table A1 of Appendix.

Panel A

	Most Active Hedge Funds	Other Hedge Funds	*Top Return Hedge Funds*	Other Hedge Funds	*Top Investor Hedge Funds*	Other Hedge Funds
	N = 134	N =313	N =53	N =394	N =51	N =396
Long term Debt Ratio Change	0.27%	0.56%	0.53%	0.47%	1.39%	0.36%
Dividend Payout Ratio Change	3.80%	-0.67%	9.39%	-0.50%*	4.00%	0.24%

Panel B

	Most Active Hedge Funds	Other Hedge Funds	*Top Return Hedge Funds*	Other Hedge Funds	*Top Investor Hedge Funds*	Other Hedge Funds
	N= 145	N= 336	N = 69	N= 412	N= 54	N=427
Director Replacement Intent	24.57%	20.54%	27.59%	20.75%	38.63%	19.58%***

*, **, and *** denotes significantly different from zero at the 10%, 5%, and 1% significance levels.

Appendix
Table A1

Definitions of Variables

Hedge Fund Variables	Description
Most Active Hedge Funds	An indicator variable for the most active hedge funds, that takes the value of 1 for those with at least 5 interventions during the most recent previous 3-year period, and 0 otherwise. That is, *Most Active Hedge Funds* in 2011 are those with at least 5 interventions during this period: 2008-2010.
Top Investor Hedge Funds	An indicator variable that takes the value of 1 for hedge funds that are in the top 10 league table of aggregate dollar investments during the most recent previous 3-year period, and 0 otherwise.
Top Return Hedge Funds	An indicator variable that takes the value of 1 for hedge funds with an average 21-day announcement period abnormal returns of at least 10% and with at least 3 interventions in rolling windows of past 3 years, and 0 otherwise.
Firm Age	The age of the Hedge fund firm computed from the year of incorporation to the year of announcement, taken from Activist Insight database.
Top Management Number	The number of top management personnel including Chairman, vice-chairman, CEO, COO, CFO and Directors, for each of the years for the years 2010-2014, taken from Activist Insight database.
Number of Portfolio Companies in which Board Seats Held	The number of portfolio companies in which the hedge fund holds at least 1 board seat as at the end of the years 2010-2014, taken from Activist Insight database.
Assets Under Management	The hedge fund firm's total assets under management (in millions of dollars) as at the end of each of the years 2010-2014, taken from Activist Insight database. Used as an Instrumental Variable (IV).
Number of Portfolio Companies	The hedge fund firm's number of firms in portfolio as at the end of each of the years 2010-2014, taken from Activist Insight database. Used as an Instrumental Variable (IV).

Target Firm Features	Description
ROA	Return on Assets, computed as net income divided by total assets, as at the end of the quarter immediately preceding the announcement date. The quarterly Compustat financial statement database is the source for both Net Income (item *69*) and Total Assets (item *44*). ROA is winsorized at the 1% and 99% levels, to mitigate the effect of outliers.
Market Cap	The market value of equity, as at the end of the quarter immediately preceding the announcement date. The market value of equity is defined as the number of shares outstanding multiplied by the end of quarter closing stock price, which are respectively data items, *61* and *14* in the Compustat quarterly financial statement database. MVE is winsorized at the 1% and 99% levels, to mitigate the effect of outliers.
Book to Market	The book to market ratio, as at the end of the quarter immediately preceding the announcement date. The book value of equity is defined as stockholders' equity plus balance sheet deferred taxes and investment tax credit, minus book value of preferred stock, which are respectively data items *60*, *52*, and *55* in Compustat's quarterly financial statement database. The market value of equity is defined as the number of shares outstanding multiplied by the end of quarter closing stock price, which are respectively data items, *61* and *14* in the Compustat quarterly financial statement database. Book-to-Market is winsorized at the 1% and 99% levels, to mitigate the effect of outliers.
Nasdaq listing	An indicator variable that takes the value of 1 for target firm that is listed on Nasdaq, and 0 otherwise.
Finance Firm	An indicator variable that takes the value of 1 for target firms that have SIC codes 60-67, and 0 otherwise.
CAR(-1+1)	The 3-day announcement period abnormal stock return, over and above the Value-weighted CRSP index return, from 1 day before the announcement date to 1 day after.
CAR(-3+3)	The 7-day announcement period abnormal stock return, over and above the Value-weighted CRSP index return, from 3 days before the announcement date to 3 days after.
CAR(-10+10)	The 21-day announcement period abnormal stock return, over and above the Value-weighted CRSP index return, from 10 days before the announcement date to 10 days after.
ROA Growth	Percentage growth in ROA of the Target firm computed as the growth rate of average ROA for the 4 quarters immediately pre-intervention, to the average for the 4 quarters immediately post-intervention.

Sales Growth	Percentage growth in Sales Revenue of the Target firm computed as the growth rate of average Sales for the 4 quarters immediately pre-intervention, to the average for the 4 quarters immediately post-intervention.
R&D Investment Growth	Percentage growth in R&D expenses of the Target firm computed as the growth rate of average R&D expenses for the 4 quarters immediately pre-intervention, to the average for the 4 quarters immediately post-intervention.
Proportion Acquired and delisted	Proportion of Target firms Acquired and delisted (CRSP delisting code between 200 and 300) within 5 years post- announcement
Proportion Liquidated/dropped and delisted	Proportion of Target firms liquidated or dropped and delisted (CRSP delisting code of more than 400) within 5 years post- announcement.
Long term Debt ratio Change	Computed as the change in average long-term debt over the book value of assets for the 4 quarters immediately pre-intervention, to the average for the 4 quarters immediately post-intervention.
Dividend Payout Ratio Change	Computed as the change in average dividend payout over income before extraordinary items for the 4 quarters immediately pre-intervention, to the average for the 4 quarters immediately post-intervention.
Intervention Features	Description
Percentage of Shares Held on Filing Date	The proportion of total shares outstanding held by the hedge fund, as of the announcement date.
Call Option	An indicator variable that takes the value of 1 if the hedge fund is mentioned as holding call options, as of the announcement date, and 0 otherwise.
Put Option	An indicator variable that takes the value of 1 if the hedge fund is mentioned as holding put options, as of the announcement date, and 0 otherwise.
Director Replacement Intent	An indicator variable that takes the value of 1 if the hedge fund intervention is with the stated objective that includes language about replacing one or more directors, and 0 otherwise.

Management Entrenchment Provisions	Description
Staggered Board	An indicator variable that takes the value of 1 for firms with staggered boards as at the end of the year immediately before the activism event, and 0 otherwise, taken from Investor Responsibility Research Center database.
Poison Pill	An indicator variable that takes the value of 1 for firms with poison pill provision as at the end of the year immediately before the activism event, and 0 otherwise, taken from Investor Responsibility Research Center database.
Golden Parachute	An indicator variable that takes the value of 1 for firms with golden parachute provision as at the end of the year immediately before the activism event, and 0 otherwise, taken from Investor Responsibility Research Center database.
Limit on bylaw amendments	An indicator variable that takes the value of 1 for firms with this provision as at the end of the year immediately before the activism event, and 0 otherwise, taken from Investor Responsibility Research Center database.
Supermajority requirement for mergers	An indicator variable that takes the value of 1 for firms with this provision as at the end of the year immediately before the activism event, and 0 otherwise, taken from Investor Responsibility Research Center database.
Limits on charter amendments	An indicator variable that takes the value of 1 for firms with this provision as at the end of the year immediately before the activism event, and 0 otherwise, taken from Investor Responsibility Research Center database.
Aggregate Entrenchment Measure	The aggregate of all the above 6 indicator variables, that measures how the extent of a firm's management entrenchment.

Table A2
Hedge Funds Investment Market Share and Market Reaction,
After Controlling for Endogeneity

The table reports the regression coefficients, and the associated *t* statistics of regressions explaining the announcement period abnormal market returns employing an instrumental variable (IV) simultaneous equations regression model using limited information maximum likelihood (LIML) estimation, where *Hedge Fund Investment Market Share*, determined without any look-ahead bias, is the endogenous covariate. The IVs are *Assets under Management,* and *Number of Portfolio Companies*. The first column shows the first stage regression estimates. All hedge fund features are as of the year-end immediately prior to the intervention, so as to be free of any look-ahead bias. The sample period is 2011-2014.

	CAR(-1+1)	*CAR(-3+3)*	*CAR(-10+10)*
Hedge Fund Investment Market Share	0.20** (2.03)	0.28* (1.87)	0.34 (1.57)
Market Cap	-0.01 (-1.31)	-0.01** (-2.07)	-0.01* (-1.65)
ROA	0.01 (0.61)	0.05 (1.57)	0.01 (0.02)
Book to Market	0.01 (0.60)	0.01 (0.92)	0.02 (1.43)
Nasdaq-listing	0.01 (1.52)	0.01 (0.94)	0.03 (1.42)
Finance Firm	-0.02*** (-2.73)	-0.03*** (-3.26)	-0.02 (-1.37)
β_Y	Yes	Yes	Yes
β_I	Yes	Yes	Yes
Pseudo/Adjusted R^2	8.87	8.78	6.20

*, **, and *** denotes significantly different from zero at the 10%, 5%, and 1% significance levels.