Size Matters:
An Empirical Analysis of Activist Hedge Funds

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Abstract

The purpose of this thesis is to examine whether large activist hedge funds on average earn lower returns than small activist hedge funds. The manually collected sample consists of 763 companies targeted by 104 hedge funds with an activist profile in the period 2000-2014 in the United States. Contrary to the predictions made, we find that the companies targeted by large funds outperform companies targeted by small funds short-term. The largest 25% of the funds earn on average a positive abnormal return of 8.0%, compared to the other 75% of the funds that earn a positive abnormal return of 4.2% in the short-term event study. However, previous literature on private equity funds and empirical results from this study indicate a reversed effect - small funds earn higher positive abnormal returns long-term.

Keywords: Hedge Fund Activism, Shareholder Activism, Fund Size, Investment Size, Abnormal Returns

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1. Introduction

Shareholder activism emerged as a form of corporate governance in the United States (US) as early as in the 1980s. Institutional investors such as pension funds and mutual funds introduced an explicit objective of influencing the strategy and management of their portfolio companies. Hedge fund activism is a later phenomenon that has been on the rise since the start of this century. By the mid 2000s, there were between 150 and 200 activist hedge funds in action each year, advocating for changes in 200-300 publicly listed companies in the US (Brav, Jiang & Kim, 2015). Zenner et al (2015), representing the American investment bank J.P. Morgan, denote the increasingly popular form of investment "The Activist Revolution", and state that no recent development has influenced firms' strategic and financial decision-making as profoundly as the surge in shareholder activism following the global financial crisis.

Zenner et al (2015) list three different sorts of activist hedge funds; established pure-play activists, new activists and multi-strategy hedge funds. Established pure-play activists generate risk-adjusted returns by investing in companies and engaging with management while proposing their view on how to achieve shareholder value creation. Many of these activists are well-known in media and followed by several investors. New activist funds are increasing in number, usually because other sorts of funds change their strategy or because former managers in established pure-play activists break out. Multi-strategy hedge funds are typically diversified in their strategies and the activist team is just one of many.

Previous literature on activist hedge funds covers several perspectives of the performance of the funds. Authors such as Brav, Jiang & Kim (2010), Klein & Zur (2009), Clifford (2008), Greenwood & Schor (2009) and Boyson & Mooradian (2010) all concludes that listed entities targeted by activist hedge funds experience significantly positive abnormal announcement-day returns for event windows of various length. Even though scholars and academics have questioned whether the positive abnormal returns hold long-term, Bebchuk, Brav & Jiang (2015) find that there are no signs of reversed effects in the long run. However, the impact of fund size on performance has rarely been discussed as of today. Therefore, literature on private equity (PE) funds is used in this thesis for theories on the relationship between size and performance. A number of interlinked reasons why small funds should perform better than large funds can be found in the literature on PE funds (Humphery-Jenner, 2011): (i) reduced number of employees per targeted company for large funds, (ii) a first-mover advantage for small funds, (iii) large funds destroy value by investing excess cash in small

companies after their main investments, and (iv) increasing benefit of financial connections by size of the target, are the most important reasons.

In this thesis, the impact of the size of the activist hedge fund portfolio on the performance of the targeted companies is analyzed by using the theories and assumptions from the PE literature as a starting point. This is an important issue for investors – to know whether to invest in a small activist hedge fund or a larger one. As Cohen, Polk & Silli (2010) conclude, by increasing the size of the fund and diversifying the portfolio, managers gain by collecting greater management fees although investors are often made worse off. The main hypothesis is that *large activist hedge funds should on average earn lower positive abnormal returns than their small counterparts.* Following the four interlinked reasons listed by Humphery-Jenner (2011), the sub-hypothesis is that *large activist hedge funds especially lose on their investments in small portfolio companies*.

The data is manually collected from the Securities and Exchange Commission (SEC) and Center for Research in Security Prices (CRSP). US investors that acquire more than 5% in a company with an intention of influencing the firm in any way are obliged, following the section 13(d) in the 1934 Securities Exchange Act, to file Schedule 13D to the SEC authorities. All filings by hedge funds with an activist profile are registered and the number of outstanding shares and stock prices are retrieved to calculate the aggregated fund size at the filing date, which is used as the event date in the event studies. The time period for the sample is 2000-2014, but the search is extended back to 1990 in order to ensure that all holdings are included in order to get the appropriate fund size.

Empirical research from a sample of 763 activist campaigns and 104 hedge funds do not support the hypotheses short-term. We conclude that, in the short-term, large funds earn higher cumulative abnormal returns (CAR) than small funds – in contradiction to the main hypothesis. The CAR is calculated over an event window of 41 days (-20, 20) around the Schedule 13D filing date. On the contrary, the results using the one-year buy-and-hold abnormal returns (BHAR) as the performance measure instead of CAR indicate that companies targeted by small funds actually outperform companies targeted by large funds in the long run. This indicative result is consistent with the main hypothesis. However, due to the extensive data collection and limited time frame the S&P 500 index is used as the benchmark for calculating BHAR, even though it is not preferable according to previous literature. Hence, using matching firms or the Fama-French model including the momentum factor is a suggestion for future research on this topic.

The thesis is structured as follows. In the next section focus is on previous literature on both activist hedge funds and other relevant types of funds. The previous findings become the basis for the hypotheses that are presented in the same section. Section 3 contains a description of the extensive data collection. In section 4, the variables used are defined and the methodology chosen to test the hypotheses is explained. Section 5 presents the empirical results and discussions on the findings in relation to previous literature and the interpretation of an activist hedge fund professional. The conclusion in section 6 is followed by a discussion of the limitations and suggestions for future research in section 7.

2. Literature Review and Hypotheses

This section includes a summary of the literature on shareholder and hedge fund activism, as well as on the impact of the portfolio size on the performance of mutual funds and PE funds. Lastly, a main hypothesis and a sub-hypothesis are formulated based on the findings in previous literature.

2.1 Shareholder and Hedge Fund Activism

Shareholder activism became a phenomenon in the US as early as in the mid-1980s, and has been discussed ever since. The California Public Employees Retirement System (CalPERS) is the largest public pension fund in the US and is considered a pioneer in institutional activism, maintaining a vigorous corporate governance reform program since 1987 (Smythe & McNeil, 2015). Early research generally focus on institutional shareholder activism, not hedge funds in particular, since activist hedge funds was a later phenomenon and the long-term effects could not be determined. Black (1998) state that shareholder activism was not negative by nature, although there was lack of evidence that institutional investors' efforts did have an effect on firm performance. Subsequently, Gillan & Starks (2007) made a review of the evidence on shareholder activism, and conclude that some studies have found positive short-term market reactions to announcements of certain kinds of activism, although there is little evidence of improvement in the long-term stock performance of targeted firms. In addition, they argue that measuring the effectiveness of shareholder activism is difficult since it can be problematic to identify certain cases of activism, and also to establish a causal link between shareholder activism and subsequent changes in governance. To some extent, this issue still remains when examining hedge fund activism today.

During recent years, several studies of the performance of activist hedge funds have been published with data from the US as well as from other parts of the world. Most

studies of activist campaigns in the US begin with Schedule 13D filings submitted to the SEC. Section 13(d) of the 1934 Securities Exchange Act requires investors who are beneficial owners of more than 5% of any class of publicly traded securities of a company, and who have an intention to influence corporate control, to disclose their ownership and intent within 10 days of crossing the 5% threshold (Brav, Jiang & Kim 2015). Previous authors such as Brav, Jiang & Kim (2010), Klein & Zur (2009), Clifford (2008), Greenwood & Schor (2009) and Boyson & Mooradian (2010) all find that listed entities targeted by activist hedge funds experience significantly positive average abnormal announcement-day returns ranging from 3.4% to 8.1% for various event windows and time periods. Results are consistent with European research, for example Becht et al (2010) that find positive abnormal returns for private as well as public engagements. Although limitations in comparability of research papers arise because of the vague and inconsistent definition of activist hedge funds and their strategies, it is however evident in previous literature that hedge fund activism generates positive short-term stock market reactions.

Lately, there has been debate on whether hedge fund activism leads to positive long-term effects on the targeted companies, and that the short-term perspective of some activists is harmful to the long-term performance and value of such companies. Criticism and concern has been raised by academics such as Bratton & Wachter (2010), Fox & Lorsch (2012) and George & Lorsch (2014). However, Bebchuk, Brav & Jiang (2015) present evidence that there are no reversals of the short-term positive abnormal returns in a longer perspective. Using the BHAR, their results indicate that the abnormal returns are positive for a three-year as well as a five-year period, although the results are not statistically significant. The authors conclude that the performance increases steadily in the five years following the time of intervention, and most importantly that there are no evidence of underperformance or reversal of the short-term positive abnormal returns in the long run.

Research on activist hedge funds have focused on several areas apart from its performance in the long and short run, for example its impact on productivity (Brav, Jiang & Kim, 2015), the effect on other stakeholders such as creditors (Klein & Zur, 2011) and employees of the targeted companies (Brav, Jiang & Kim 2015). Nevertheless, the size characteristics of the activist hedge funds and its importance for the performance have not yet been discussed to a larger extent in the literature so far. Therefore, this study makes a scientific contribution to previous literature by examining the importance of activist hedge fund size based on theories and assumptions from literature on similar fund types.

2.2 Importance of Fund Size

No previous literature is comparing the performance of the targeted companies based on size characteristics and specifically focuses on activist hedge funds. Therefore, literature on PE funds as well as mutual funds is used for theories that can be applied on activist hedge funds as well.

In the paper "Best Ideas" (Cohen, Polk & Silli, 2010), the authors argue that the stocks the active managers of mutual funds display the most conviction towards ex-ante outperform the market. In addition, they find that the best ideas of small or concentrated funds outperform their large, diversified counterparts. The concentration is defined using a normalized Herfindahl index measure of the positions in the fund, and the size is defined as assets under management (AUM) of the mutual fund. The authors claim that this is consistent with the intuition, that managers with lower amounts of AUM have more options and may put greater effort into selecting their best ideas. They conclude that by increasing the size of the fund, diversifying the portfolio and decreasing the volatility, managers gain from higher management fees while the typical investor is probably made worse off. Investors can possibly gain substantially if the manager's portfolio is more concentrated and less diversified.

The findings of Cohen, Polk & Silli are important as a basis for the hypotheses in this thesis, but to get a more specific representation of activist investors the review are broadened to literature concerning fund sizes impact on the performance of PE funds. Lopez-de Silanes, Phalippou & Gottschalg (2009) find that small PE funds perform better than large PE funds. This is consistent with later results by Humphery-Jenner (2011), who also conclude that large PE funds especially lose when they invest in small portfolio companies. Humphery-Jenner lists four interlinked reasons why this underperformance by large funds is possible while they might have several advantages such as better connections with financial institutions and the possibility to diversify internationally. To begin with, if large funds invest in small companies, they reduce the number of staff per company. This can destroy value by reducing the attention that each professional gives to each company (following Cumming, 2006; Lopez-de Silanes, Phalippou & Gottschalg, 2009; Cumming & Dai, 2011). Secondly, small funds might gain from a first-mover advantage when investing in small companies. Since small funds encounter capital and location constraints, they may find the best investments in small companies before large funds do so. Thirdly, large funds tend to invest in small companies when they have excess cash, which could destroy value. Lastly, the authors note that the large PE funds' advantage of better connections with financial institutions might also be a limitation,

since this benefit increases with the amount of financing needed – which calls for an investment in a large company.

These explanations why small PE funds should perform better than large PE funds, may also be applicable to activist hedge funds as both fund types advocate active ownership. Therefore, we proceed from this point when forming the hypotheses.

2.3 Hypotheses

Previous literature suggests that activist hedge funds generate positive abnormal returns in the short run as well as in the long run. Research on PE funds and actively managed mutual funds both support the thesis that small funds on average perform better than large funds. To date, research on whether small activist hedge funds outperform their large counterparts does not exist in any large extent. Using research from the PE universe, predictions can be made that large activist hedge funds generate lower positive abnormal returns than small activist hedge funds. These predictions result in the main hypothesis:

H_1: *Large activist hedge funds should on average earn lower positive abnormal returns than their small counterparts*

As previously mentioned, Humphery-Jenner (2011) also concludes that large PE funds tend to lose when they invest in small portfolio companies. Hence, investments by large funds in small companies explain to a large extent why large funds perform poorly. This relationship could also exist among activist hedge funds. The four interlinked reasons previously mentioned in section 2.2, that can be applicable on activist hedge funds as well, all suggest that large activist hedge funds primarily should lose on their investments in small portfolio companies. A sub-hypothesis is formulated as a possible explanation of the main hypothesis:

H_2: *Large activist hedge funds should especially lose when they invest in small portfolio companies*

3. Data

3.1 Data Collection

Without access to databases of hedge funds and their portfolio companies, the data collection is conducted manually. Consequently, a sample of hedge funds and their activist investments

in the US during 2000-2014 are hand collected. The starting point of the data collection is to create a list of activist hedge funds and multiple strategy hedge funds that have been engaged in activist interventions during this period. A list of 220 hedge funds with an activist profile is downloaded from S&P CapitalIQ, that is, hedge funds that have at some point submitted a Schedule 13D filing to the SEC. By using this list and not a hedge fund index such as CFSB/Tremont, both existing and currently non-existing hedge funds are covered. In addition, the backfilling bias should be avoided since the hedge funds do not report to S&P CapitalIQ voluntarily. To confirm the validity of the hedge fund sample, it is compared to the website CarriedIn's list of activist investors. In addition the funds' websites are browsed and additional searches for hedge funds with an activist profile are made.

The second step of the data collection process is to retrieve the portfolio companies of each of the 220 hedge funds, and determine in which of these investments the hedge fund have had an intention to influence corporate control. To get the holdings of each hedge fund and the holding period of the portfolio companies, the Thomson Reuters database of 13F filings is used. The 13F filings are reported to the SEC by institutional investment managers with US mail and USD 100 million or more in AUM. In the SEC's EDGAR archives we search for 13D filings submitted by each hedge fund to determine the investments where active interventions were pursued. SEC allows beneficial investors who have purchased more than 5% of the shares in a company, and do not intend to influence corporate control, to file Schedule 13G. The purposes for filing Schedule 13D are many and include, but are not limited to, seeking seats on the company's board, replacing the CEO, opposing a merger or liquidation or influencing the strategic choices of the firm. It has been discussed whether hedge funds truthfully disclose the 13D filing, but as Clinton (2008) notes, hedge funds have strong incentives to do so, mainly because the management of target companies can effectively use misstatements of intentions as a basis for lawsuits against the activists. To ensure that all portfolio companies during the period are included in the sample, we go through all 13D filings and amendments, even before year 2000. The filing date of the first 13D filing becomes the identifier of the start of the activist campaign, and the ownership stake reported is later used to calculate the investment size. If any of the hedge funds have no 13F or 13D filings in the databases, the hedge fund is dropped from the sample. Conclusively, 118 activist hedge funds and 1,150 targeted portfolio companies are collected altogether.

Finally, the data on holding periods and filing dates are used to pick up stock prices from the CRSP database for each targeted company in each hedge fund portfolio. Daily

stock returns covering the holding period and, if possible, one year prior to and two years following the filing date are collected.

3.2 Data Processing

For each of the 118 hedge funds in the sample, a workbook in Microsoft Excel is created where data from Thomson Reuters, SEC and CRSP are gathered. Input such as company name, filing date, share prices, number of shares, daily returns and ownership stake as a percentage are added. Next, the size of the investment, ownership stake multiplied by market capitalization, is calculated. This process is reproduced for each targeted portfolio company. At the end, the data is compiled in an output sheet with the return of the portfolio for each day during the period 2000-2014, the aggregated value of the portfolio at each filing date, the filing date, the number of trading days from the filing date, the ownership stake acquired at the filing date in percent and the number of portfolio companies for each fund. The aggregated value of the portfolio is the best approximation possible for the size of the active fund.

From the gross list of 118 hedge funds with 1,150 targeted companies, observations that lie outside the observed time period are dropped. Companies that do not have enough share price data in the created estimation window[1] and event window[2] are dropped as well, providing a sample of 104 hedge funds with 763 targeted companies for the short-term event study and 99 hedge funds with 651 targeted companies for the long-term event study.

3.3 Descriptive Statistics

The sample is divided into quartiles based on the size of the activist hedge fund at the filing date for each targeted company. The first quartile is the smallest 25% of the funds, and the fourth quartile is the largest 25% of the funds. The average size of the hedge funds in the sample is USD 649.9 million while the median is USD 147.3 million, which implies that the sample is biased towards small funds (figure 4). The bias is adjusted for by calculating the natural log of the fund size before running regressions (section 4.2).

The average ownership stake an activist hedge fund takes at the filing date is similar among the quartiles and range between 8.8% and 9.7%. A larger difference can be seen in the average number of holdings the hedge funds have among the quartiles, where the smallest funds have on average six companies in their portfolio and the largest funds have on average eleven companies in their portfolio at the filing date.

[1] 252 trading days before the event until 21 trading days before the event (-252, -21)
[2] (-20, 20) short-term, and (0, 252) long-term

The distribution of activist events per year shows that the activity increased in the years building up to the financial crisis and has in recent years been at a more stable level (figure 3). One possible explanation of the lower number of activist campaigns in the early 2000s in the sample is that funds with less than USD 100 million are excluded from the sample since they do not file 13F to the SEC. The activist hedge funds have probably accumulated larger funds over the years and more funds have therefore qualified as time goes by. The number of activist campaigns has averaged at 59 campaigns per year.

4. Methodology

In order to test the hypotheses and study the relationship between the explanatory variables and the abnormal returns, an appropriate measure of the abnormal returns is needed for a given time period. Therefore, the first step of the analysis is to calculate the abnormal returns before moving on to the main regressions. The analysis is divided into two parts. Firstly, the abnormal returns are studied over a short-term event window, which is followed by a study of the abnormal returns over a longer time period to examine if there are any indications of changes or reversals over time. There are two different ways of aggregating abnormal returns, either by using arithmetic series or geometric series. For the short-term event study, the abnormal returns are calculated as arithmetic CAR. Scholars have criticized the use of CAR on economic grounds since investors do not earn abnormal returns on each day, and therefore proposed the BHAR (Barber & Lyon, 1997). Being aware that there will be a small bias between the two measures since accumulating daily returns over a longer period will tend to be misleading, the BHAR are used for the long-term analysis. The process of calculating abnormal returns is followed by several regressions where the explanatory power of the independent variables is tested on the measures of the abnormal returns.

4.1 Performance variables

4.1.1 Cumulative Abnormal Returns

For the short-term abnormal returns, the CAR is calculated over an event window of 41 trading days (-20, 20). The date of the Schedule 13D filing is defined as the event date, since this is usually when the event is first publicly announced. Nevertheless, this filing date is not always the correct announcement date since the hedge funds have 10 days to file after crossing the 5% border. This approximation of the event date is consistent with the results of Boyson &

Mooradian (2007), who used news searches to find the leakage date and used it as the event date.

The event window is set to 20 trading days before and 20 trading days after the filing date to capture early leakage of information as well as the short-term impact on the stock price following the announcement. In order to get an estimation of the expected performance of the stock during the event window, an estimation window is set to 252 trading days before the event until 21 trading days before. Target firms that miss stock data for more than 215 days in the estimation window or any day in the event window are dropped from the sample. In the estimation window, the S&P 500 index is used as a proxy for the market return in order to calculate the expected return. According to MacKinlay (1997), statistical models, such as the market model, avoid biases that may arise when using economical models, such as CAPM or Fama-French, for event studies. To avoid these biases, the market model is chosen to estimate the normal performance. By regressing the actual return on the market return, values of beta and alpha are produced for each stock. The beta and alpha values are used in the event window to predict the normal performance.

(1) $$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}$$

The abnormal return for each day in the event window is calculated as the difference between the actual return of each stock and the predicted return using the beta and alpha from the regression. The sum of the abnormal returns during the event window results in a CAR for each target company that can be used in later regressions.

(2) $$AR_{it} = R_{it} - E(R_{it} | \, X_t)$$

(3) $$CAR_i \, (T1, T2) = \sum_{t=T1}^{T2} AR_{it}$$

4.1.2 Buy-and-Hold Abnormal Returns

Brav et al (2008) define the median holding period of an activist hedge fund to one year or more, and the average holding period to 22 months. In order to avoid the effect of targeted companies being dropped from the sample to the largest extent possible, a one-year time period is chosen to analyze the effects from an activist campaign after the filing date.

Barber & Lyon (1997) conclude that BHAR provides a better estimate of long-term abnormal returns than CAR, since CARs are biased predictors of BHAR. Based on the

findings of Barber & Lyon, BHAR are chosen as the measure of long-term abnormal returns. The targeted company's actual return is benchmarked to the return on the S&P 500 index to calculate the BHAR. This method allows us to get an estimate of the long-term effect of being targeted by an activist hedge fund. The formula for calculation of BHAR is presented below:

$$BHAR_{i(T1,T2)} = \prod_{t=T1}^{T2}(1 + R_{it}) - \prod_{t=T1}^{T2}(1 + E(R_{it}|\, X_{it})) \quad (4)$$

Barber & Lyon (1997) argue that matching sample firms to control firms is favorable to using a reference portfolio, for example a market index. The use of the broad S&P 500 index is a limitation that is further discussed under section 7.1. Therefore, the findings in section 5.2 of the long-term effects should merely be seen as an indication of the result.

4.2 Size Variables

The independent variables in the regressions will control for the size of the fund, the size of the investment and the interaction between the two of them. Each of the variables used is described below:

ln(Fund Size) is a continuous variable computed as the natural log of the size of the fund. The size of the fund is defined as the share of the AUM that is invested in companies with an activist objective. Each portfolio company's contribution to the fund size is calculated as the ownership stake (%) multiplied by the market capitalization at the filing date. Cash is excluded, so that the fund size only represents the invested capital that the management of the fund has to monitor. The natural log is used since the values of the fund sizes are biased, which is clear looking at the histograms in figure 4.

1/ln(Investment Size) is a continuous variable computed as the inverse of the natural log of the size of the investment. The investment size of each portfolio company is calculated as the ownership stake (%) multiplied by the market capitalization of the targeted company at the filing date. This variable is used in order to capture the impact of investing in small companies.

ln(Fund Size) × *1/ln(Investment Size)* is a variable defining the interaction between the two variables described above. This variable allows examination of the relationship between large funds and small investments, which is the objective in accordance with the sub-hypothesis H_2.

Ownership is a variable that defines the percentage stake in the targeted company that the activist hedge fund holds at the filing date. This proportional variable is difficult to

model in a linear regression, since it only takes values between 0 and 1. The problem is that the relationship will be sigmoidal instead of linear. According to Long (1997), a feasible approach is to do a linear regression anyway when the variable is a part of a multiple regression.

4.3 Ordinary Least Squares Regressions

There are two issues examined in the empirical study: (i) whether large funds earn lower returns than small funds, and (ii) the relation between fund size and investment size. In order to test this, several regressions are carried out using the performance variables and size variables described above. The regressions are done using robust standard errors, to ensure that standard errors take into account heterogeneity and the lack of normality. However, we start off by dividing the observations into four categories based on the quartiles of their fund size, and dummy variables are created for each quartile category. Next, a regression analysis is done to clarify whether there are any statistically significant differences between the quartile categories in explaining the abnormal returns. One of the dummy variables, preferably the smallest or largest group, is omitted in the regression and used as the reference group for the other three variables. This is a first step in determining whether funds of different sizes outperform each other. Using BHAR as the performance measure, the same process is carried out for the long-term event study.

Subsequently, by doing a regression of the CAR on the size variables described in section 4.2, both the hypotheses can be tested. In regression 5, the relationship between the performance variable CAR and the natural log of the fund size variable is analyzed. The coefficient in the regression (beta) specifies whether the relationship is negative or positive, that is, whether companies targeted by small funds perform better or the other way around.

(5) $$CAR = \alpha + \beta(ln(Fund\ Size))$$

After the initial regressions, there will hopefully be enough information to determine whether companies targeted by small funds perform better than companies targeted by large funds. In the following regressions, an analysis of whether the funds especially lose when investing in a company of a certain size will be conducted. The regression is done stepwise, to examine if there are any differences in the explanatory power. When using these variables, there might be a risk for multicollinearity - which do not affect the model as a whole, but the individual variables. This risk has to be taken into account when analyzing the results. In regression 8, the interaction of the natural log of the fund size and the inverse of the natural log of the investment

size is analyzed. For example, a negative measure of β_3 indicates that large funds especially lose when investing in small companies. This regression will help determine whether the sub-hypothesis is correct or not.

(6) $$CAR = \alpha + \beta(1/ln(Investment\ Size))$$

(7) $$CAR = \alpha + \beta_1(ln(Fund\ Size)) + \beta_2(1/ln(Investment\ Size))$$

(8) $$CAR = \alpha + \beta_1(ln(Fund\ Size)) + \beta_2(1/ln(Investment\ Size)) + \beta_3(ln(Fund\ Size) \times 1/ln(Investment\ Size))$$

Another regression, using ownership as an independent variable, is performed to analyze whether the ownership stake invested at the filing date has any additional explanatory power in explaining the performance of the targeted company.

(9) $$CAR = \alpha + \beta_1(ln(Fund\ Size)) + \beta_2(Ownership)$$

5. Empirical Results

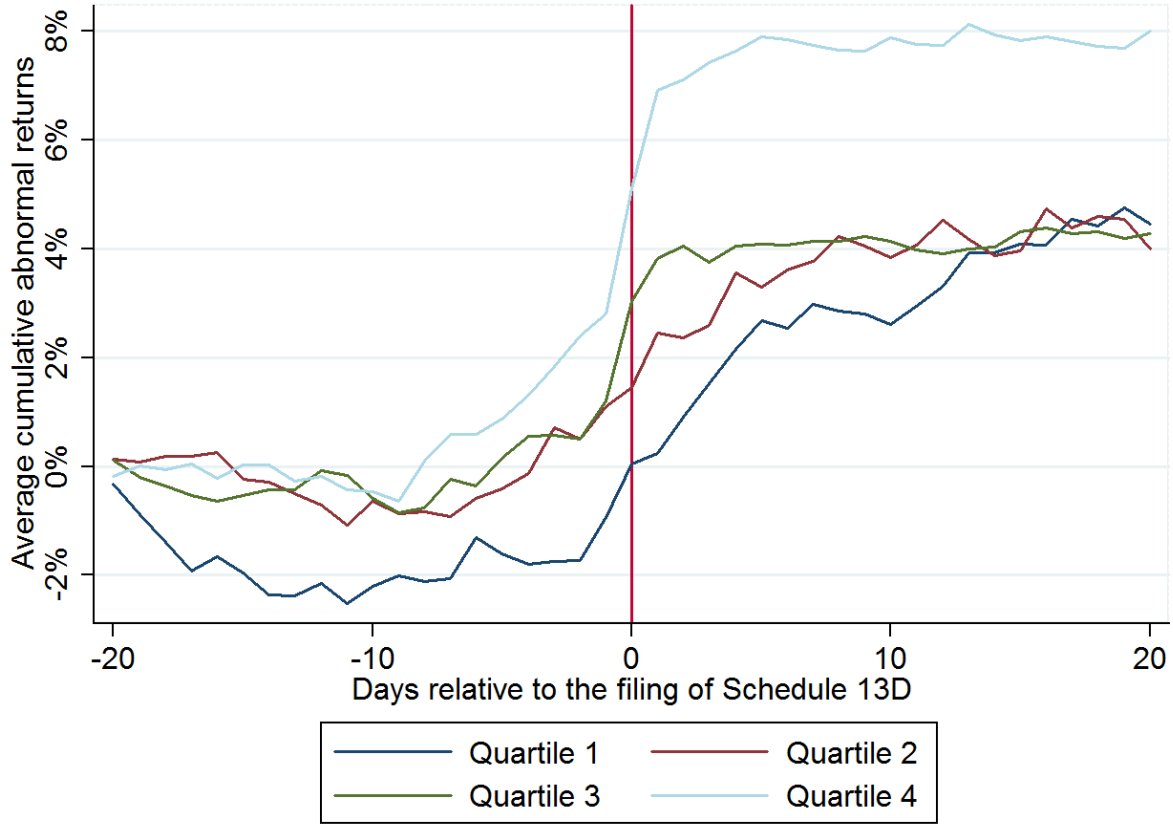
In this section, the results from the tests are presented. The section is divided into three parts, tests using CAR in the short run and an indication of the results using BHAR in the long run. In addition, a Vice President at one of the world's largest activist hedge funds, Cevian Capital, has been interviewed in order to help interpreting the results.

5.1 Testing Hypotheses in the Short-Term

Figure 1 shows the mean of the short-term CAR over the event window. The mean of CAR in the sample during the sample period 2000-2014 is 5.3%, which is consistent with previous authors' findings ranging from 3.4% - 8.1% (Brav, Jiang & Kim, 2010; Klein & Zur, 2009; Clifford, 2008; Greenwood & Schor, 2009; Boyson & Mooradian, 2010). The value of R-squared is remarkably low throughout the regressions, which definitely would have been a problem if a prediction that is reasonably precise was needed. However, since the main objective is to determine whether the independent variables are statistically significant in explaining the dependent variable, the low R-squared is not necessarily problematic.

5.1.1 Testing Differences between Fund Size Quartiles

Figure 1: Comparison of average cumulative abnormal returns between fund size quartiles



The lines plot the average cumulative abnormal return (CAR) for each quartile (the first quartile includes the smallest funds and the fourth quartile includes the largest funds) in the event window (-20, 20). The event date is defined as the filing date of Schedule 13D, which is marked with the vertical red line. CAR is calculated as the difference between actual returns and predicted returns.

In figure 1, the average of the four fund size quartiles' CAR is graphed over the event window. The mean of the CARs of the companies targeted by the largest funds are clearly higher than the other three groups, although the smallest funds earn higher CAR than the funds in the second and third quartile. The results of the regression with dummy variables for each quartile category are shown in table 1. The second and third quartile are significantly different from the fourth quartile in explaining the CAR on a 10% level. The null hypothesis that the fourth quartile is similar to the first quartile in explaining the CAR cannot be rejected. Since the coefficients of the first, second and third quartiles are rather similar, a new regression is made where the quartiles are aggregated into one category that is compared to the fourth quartile. Results are shown in table 1, which shows that the group of quartiles is significantly different from the fourth quartile in explaining the CAR on a 5% level.

From the sample, it can be concluded that there are significant differences in size when explaining the abnormal returns over a short–term event window. Still, the large funds earn the highest CAR, in contradiction to the main hypothesis. In section 5.3, the possible reasons to this will be discussed.

Table 1: Regression of cumulative abnormal returns on fund size quartile dummy variables

Dependent variable	CAR		CAR	
Quartile 1	-0.0357	(0.0239)		
Quartile 2	-0.0402*	(0.0214)		
Quartile 3	-0.0373*	(0.0217)		
Quartile 1-3			-0.0377**	(0.0166)
Constant	0.0801***	(0.0130)	0.0801***	(0.0129)
Observations	763		763	
R^2	0.005		0.005	

This table presents the regression results for the dummy variables used to test if there is any difference in cumulative abnormal return (CAR) for companies targeted by funds of different sizes. The fourth quartile (including the companies targeted by large funds) is used as a reference group. In the second column, the first, second and third quartiles are grouped to test if the fourth quartile is different from the other quartiles combined. Robust standard errors are used in all regressions and are reported within parentheses. *, **, *** represent significance at the 10%, 5% and 1% level, respectively.

5.1.2 Ordinary Least Squares Regressions

The regressions of the CAR on the size variables described in section 4.2 are made stepwise and are summarized in table 2. To begin with, the first finding is consistent with the result from the previous section (5.1.1). The beta coefficient in the first regression, with the natural log of the fund size as the independent variable, is positive and significantly different from zero on a 10% level. This finding suggests that the CAR of the fund increases when the fund size increases, and that large funds perform better short-term.

In the second column in the regression table, the beta coefficient of the inverse natural log of the investment size is negative and statistically significant on a 5 % level. The CAR of the targeted company is lower when the investment size is smaller. This result makes

Table 2: Interaction regressions

Dependent variable	CAR		CAR		CAR		CAR		CAR	
ln(Fund Size)	0.0098*	(0.0055)			0.0041	(0.0085)	-0.0204	(0.0498)	0.0099*	(0.0055)
1/ln(Investment Size)			-3.0230**	(1.4100)	-2.2270	(2.1850)	-10.3500	(16.8600)		
ln(Fund Size) × 1/ln(Investment Size)							0.4220	(0.8660)		
Ownership Stake									0.1350	(0.1620)
Constant	-0.1330	(0.1080)	0.2300***	(0.0813)	0.1060	(0.2730)	0.5790	(0.9910)	-0.1480	(0.1050)
Observations	763		763		763		763		763	
R^2	0.004		0.005		0.006		0.006		0.006	

This table presents the continuous variables from the main regressions, and makes it possible to examine the impact of fund size as well as the investments by large funds in small companies. The targeted company's CAR is the dependent variable. ln(Fund Size) denotes the natural log of the active part of the assets under management. 1/ln(Investment Size) is the small investment variable which is the inverse of the natural log of the fund's investment size. ln(Fund Size) × 1/ln(Investment Size) describes the interaction between the fund size and the investment size which is used to test if large funds lose by investing in small companies. Robust standard errors are used in all regressions and are reported within parentheses. *, **, *** represent significance at the 10%, 5% and 1% level, respectively.

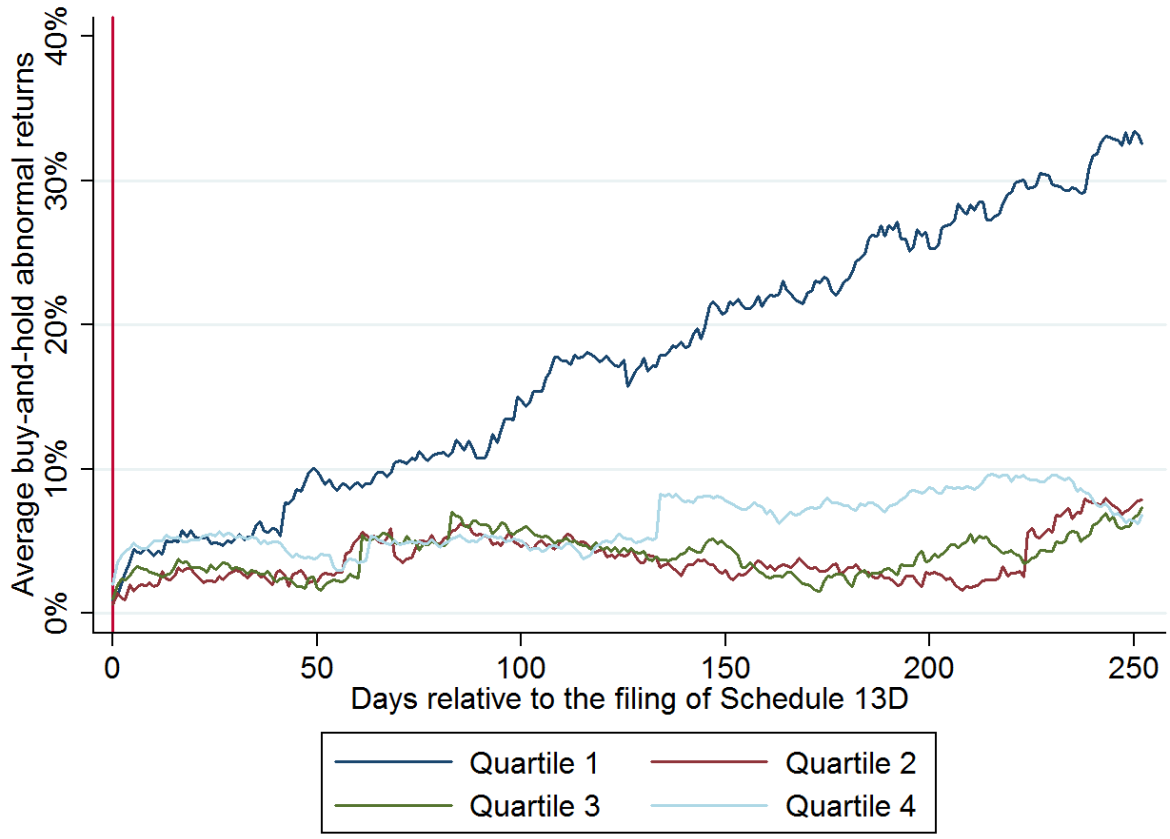
sense – since larger funds perform better, larger investments should also exhibit greater abnormal returns.

However, to test the sub-hypothesis the interaction variable is included in the fourth column. The key result here is that the coefficient of beta, β_3, is positive which means that large funds earn higher returns when they invest in small companies. This finding is not consistent with the hypothesis. In addition, the result is not statistically significant. The null hypothesis that β_3 is equal to zero cannot be rejected.

To sum up, the short-term results do not support the hypotheses. Large funds earn higher returns than the small funds do and there is no evidence supporting the sub-hypothesis at all. These findings are interpreted in section 5.3.

5.2 Testing Hypotheses in the Long-Term

Figure 2: Comparison of average buy-and-hold abnormal returns between fund size quartiles



The lines plot the buy-and-hold abnormal returns (BHAR) for each quartile in the event window - at the date of filing Schedule 13D to 252 days after the filing date. BHAR is calculated as the difference between actual returns and market returns of the S&P 500 index.

In figure 2, the average of the four fund size quartiles' BHAR is graphed over the one-year event window. The performance of the companies targeted by the funds in the first quartile is clearly better than those targeted by funds in the other quartiles. The average BHAR for the targeted companies one year after the filing date in the first quartile is 32.6% while the BHAR for the second, third and fourth quartile is 7.9%, 7.4% and 6.8%, respectively. The results of the regression with dummy variables for each quartile category are presented in table 3. The second and fourth quartile are significantly different from the first quartile in explaining the BHAR on a 1% level, and the third quartile is significantly different from the first quartile in explaining the BHAR on a 5% level.

In the sample, there is a significant difference between the first quartile and the other quartiles in explaining the BHAR in the long run. The companies that are targeted by smaller activist hedge funds should perform better than those targeted by larger activist hedge funds. Although the results only can be seen as indicative as discussed in the limitations section 7.1, they are in line with the main hypothesis.

Table 3: Regression of buy-and-hold abnormal returns on fund size quartile dummy variables

Dependent variable	CAR
Quartile 2	-0.247*** (0.0918)
Quartile 3	-0.252** (0.0991)
Quartile 4	-0.257*** (0.0954)
Constant	0.326*** (0.0768)
Observations	651
R^2	0.019

This table uses dummy variables to test if there is any difference in buy-and-hold abnormal returns for companies targeted by funds of different sizes. The first quartile (including the companies targeted by small funds) is used as a reference group to test if it is different from the other quartiles. Robust standard errors are used in the regression and is reported within parentheses. *, **, *** represent significance at the 10%, 5% and 1% level, respectively.

5.3 Comments from an Activist Professional

In the short-term event study, the results are in contradiction to the main hypothesis that the companies targeted by small activist hedge funds generate higher abnormal returns than the companies targeted by large activist hedge funds. An interview with an activist professional,

Niko Pakalén[3], was conducted to get his thoughts on the performance of activist hedge funds based on their portfolio size.

Pakalén says that one of the most important factors for generating positive short-term abnormal returns when investing in entities is the reputation of the fund. The largest funds usually have a good track record, as they have been able to generate positive alphas in their previous investments. A good track record is a must in order to attract investors and increase the AUM. Therefore, when a large activist hedge fund invests in a company, the financial market will have positive expectations and the stock often experience positive abnormal returns.

The activist environment in the US is different from the environment in Europe. The activist hedge funds in the US are more aggressive and use the public attention to a larger extent when they file Schedule 13D filings. Pakalén remarks, in accordance with Zenner et al (2015), that the hedge funds in the US use a number of platforms to publicly disseminate their intention of the ownership, for example, publicly disclosed letters to the management or the board, write a public white paper detailing their criticism and suggestions or publish letters directly to shareholders. Larger funds have the ability to attract more attention and get more investors involved in the agenda of the hedge fund.

The fees charged by hedge funds (both the fixed management fee and variable profit share) are directly related to the size of the AUM. This implies that the larger hedge funds can earn more money, and thus have the ability to attract a more skilled investment team. Attracting the best possible teams should also mean that they are better at finding undervalued stocks where a lot of improvements can be done, which can create positive abnormal returns among larger activist hedge funds.

6. Conclusions and Implications

In this thesis, the relationship between the fund size, investment size and the return of the targeted company is examined focusing on activist hedge funds in the US in the period 2000-2014. The findings support that large funds on average earn higher positive abnormal announcement-day returns than small funds. Nevertheless, the findings also indicate that small funds outperform large funds in the long run.

[3] Niko Pakalén is a Vice President at the Anglo-Swedish activist hedge fund Cevian Capital. Cevian Capital has approximately EUR 11bn in assets under management, which makes it one of the world's largest activist hedge funds.

In previous literature on activist hedge funds, several authors have found that the companies targeted by activist hedge funds experience positive abnormal returns. The initial predictions that large funds earn lower positive abnormal returns than small funds, and that large funds especially lose on investments in small companies, are based on literature from the PE universe. These theories were expected to hold for the activist hedge funds as well.

The empirical results do not present any evidence of large funds losing on investments in small companies. However, the findings support that the fund size really matters. In a short-term event study, large funds earn significantly higher positive abnormal returns than smaller funds, contrary to the main hypothesis. There is a possibility that this finding reverses in the long run, since the brief long-term event study indicates that small funds earn significantly higher positive abnormal returns than larger funds. Nevertheless, the difference in long-term performance between companies targeted by the smallest funds and the largest funds (32,6% and 7,4%, respectively) is so significant that the result can be assumed to hold even with a better benchmark as suggested by Barber & Lyon (1997) and Brav et al (2008 and 2010).

How come that the short-term results are in direct contradiction to the predictions? With the help of a professional activist hedge fund manager, an explanation of the short-term event study results could be found. One of the most important factors for generating short-term positive abnormal returns is the reputation of the fund. The largest funds usually have a good reputation based on their track record, and the track record of generating positive alphas is what makes them large. In addition, large funds can usually attract a more skilled investment team that might be better at finding undervalued stocks with upside potential.

In conclusion, empirical results presents evidence of large funds outperforming the others short-term. Still, there are reasons to believe that this will not hold long-term, and that small funds will perform better as time goes by. Both the indicative results in this thesis and previous literature on PE suggest a reversed effect. Whether these indications are true should be further examined. Not necessarily for the sake of the managers, but for the good of the investors.

7. Limitations and Future Research

In this section, the definitions and delimitations made in this thesis will be discussed, and the impact of these decisions on the empirical results and the conclusions drawn. In addition, suggestions for future research are described.

7.1 Limitations in Interpreting the Results

Mainly, this section will focus on the limitations in the methodology of defining the performance and size variables, as well as the issue of causality and correlation.

The fund size is defined as the share of the AUM that is invested in companies with an activist objective. This definition is made to only include the investments that require full commitment by the managers, and to reflect a PE fund in the best way possible. However, one can argue that the total amount of AUM should be used instead. Multi-strategy funds, for example, only have a small part of their capital invested with an activist objective. Compared to a pure activist hedge fund with the same amount of capital invested, large multi-strategy funds benefit from economies of scale. A wider definition of fund size might lead to different findings, and is a possible topic for future research.

Without access to any database on hedge funds, all data needed for the empirical analysis are manually collected. This alone is a possible source of error, but most importantly some simplifications of the reality must be made because of the data available. One of the simplifications made is the treatment of the fund size at the filing date. This simplification do not affect the investment size, since the ownership stake reported to SEC at the filing date is used to calculate the size of the investment. The 13F filings of a fund's holdings, in the Thomson Reuters database, are reported to the SEC quarterly. This means that we do not have the precise ownership stake for a fund's other holdings than the stake of the company that is targeted at the filing date. Consequently, the use of quarterly data is a limitation when interpreting the results.

The calculation of BHAR for the long-term studies requires an appropriate estimate of the normal performance. Due to the extensive data collection and the limited time frame, the broad S&P 500 index is used to get an indication of the results during a longer period than the 41-days event window. There are several ways of determining the BHAR in a more precise way. Barber & Lyon (1997) argue that matching sample firms to control firms instead of using a reference portfolio, for example a market index, is favorable due to three sources of misspecification. New listing bias, rebalancing bias and skewness bias are biases that can be avoided by using a matched set of control firms. Propensity score matching on a 1-to-1 basis by matching on market capitalization, industry codes and year would have been a more appropriate alternative. Another alternative used by Brav et al (2008 and 2010) in order to calculate the long-term abnormal returns would be to use the Fama-French size and book-to-market factors, and the Carhart momentum factor.

Lastly, “correlation does not imply causation” is a well-known expression in statistics. It is hard to establish a causal link between hedge fund activism and subsequent changes in governance and the development of the share price. Above all, this issue is relevant when examining the abnormal returns of hedge fund activism in the long run. During a short-term event study, it is easier to identify causality.

7.2 Suggestions for Future Research

The limitations in this thesis open up possibilities for future research. To begin with, it would be interesting to examine whether fund size defined as the total AUM generates a different result. Another interesting topic for future research would be to study the long-term size effects on the performance of the targeted companies more accurately. The empirical results suggest that there is a reversed effect consistent with previous research on PE funds, although more effort is needed to confirm this effect.

As discussed in section 5.3, large funds tend to attract more attention and get more investors involved in the agenda of the hedge fund. This is one of the explanations why large funds earn higher positive abnormal returns than small funds short-term. We believe that it would be interesting to examine how much of the over performance by large funds that can be explained by media attention around the investment date. This would statistically help explain the results in this thesis and add value to existing research on activist hedge funds.

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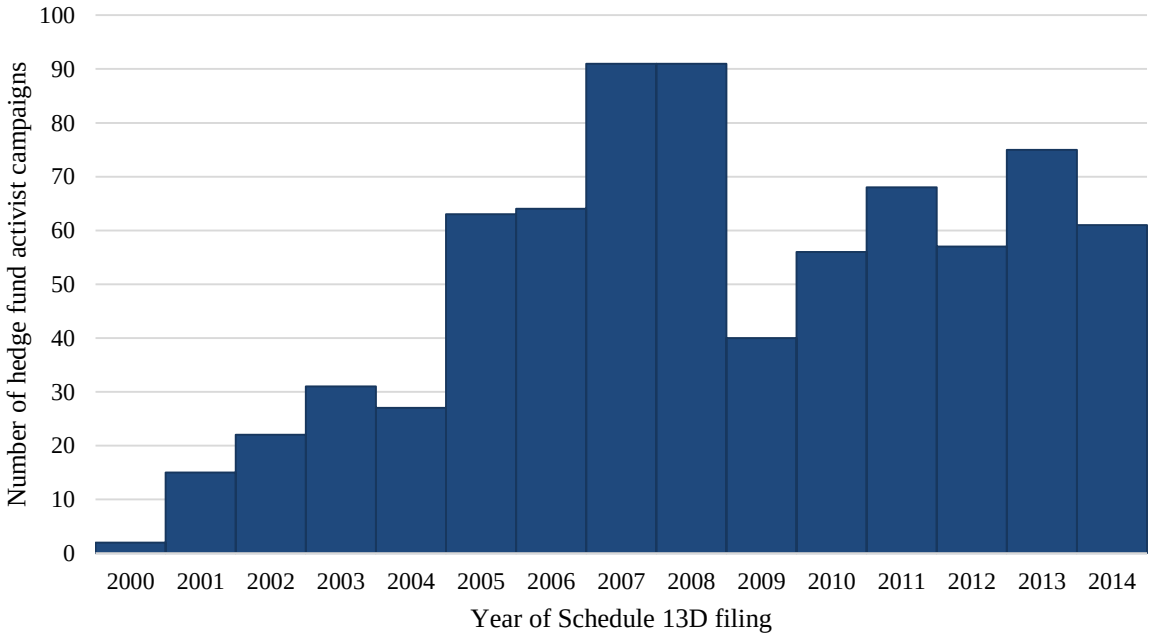
Appendix

Table 4: Descriptive statistics

		Panel (a)				Panel (b)		
	Total	Quartile 1	Quartile 2	Quartile 3	Quartile 4	00-04	05-09	10-15
Number of activist hedge funds	104							
Number of portfolio companies	763	181	185	187	210	97	349	317
Average fund size (USDm)	649.9	32.1	95.1	251.1	2,026.4	258.6	500.2	934.6
Average investment size (USDm)	130.8	11.6	22.7	71.8	381.3	70.4	120.2	160.9
Average ownership stake	9.3%	9.6%	9.7%	8.8%	9.1%	9.9%	9.5%	9.0%
Average number of holdings	9.3	5.8	10.8	8.8	11.4	8.5	9.9	8.9
Cumulative abnormal returns								
Mean	5.3%	4.4%	4.0%	4.3%	8.0%	9.1%	3.7%	5.8%
Max	141.7%	141.7%	83.0%	108.4%	73.9%	75.3%	141.7%	85.8%
Min	-90.8%	-85.4%	-79.4%	-90.8%	-46.3%	-70.8%	-90.8%	-79.4%
Standard deviation	23.2%	27.0%	23.1%	23.7%	18.8%	24.5%	25.9%	19.3%

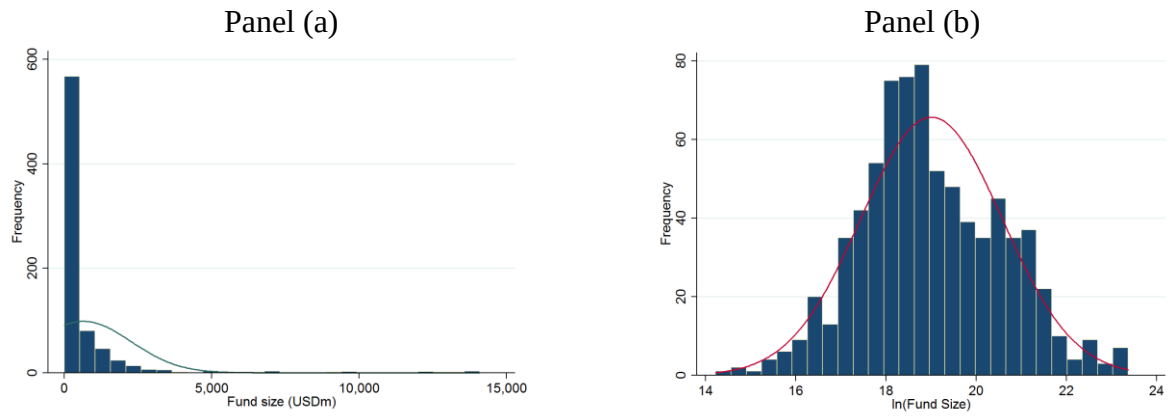
Panel A shows the descriptive statistics for the targeted companies after being sorted into quartiles based on the fund size. The first quartile includes the smallest funds and the fourth quartile includes the largest funds. Panel B shows the descriptive statistics for the targeted companies after being sorted into time periods based on when the hedge fund filed the first Schedule 13D filing.

Figure 3: Number of activist campaigns per year



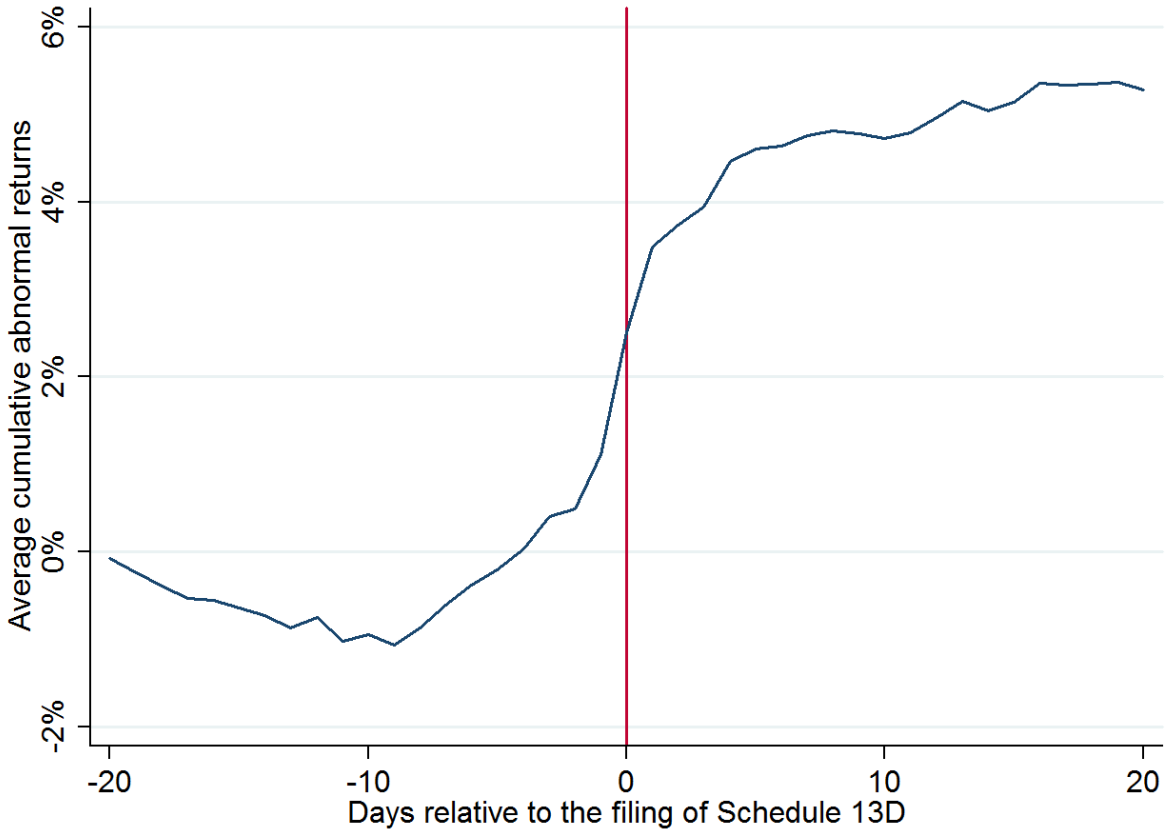
The bar chart shows the activist hedge fund activity per year. Each campaign is plotted in the corresponding year as the Schedule 13D filing occurred. The total sample contains 763 filings.

Figure 4: Distribution of fund size



Panel (a) shows the skewed distribution of fund sizes in the sample. Panel (b) shows the natural log of the distribution of fund sizes in the sample. The total sample contains 763 companies targeted by 104 activist hedge funds.

Figure 5: Average short-term cumulative abnormal returns



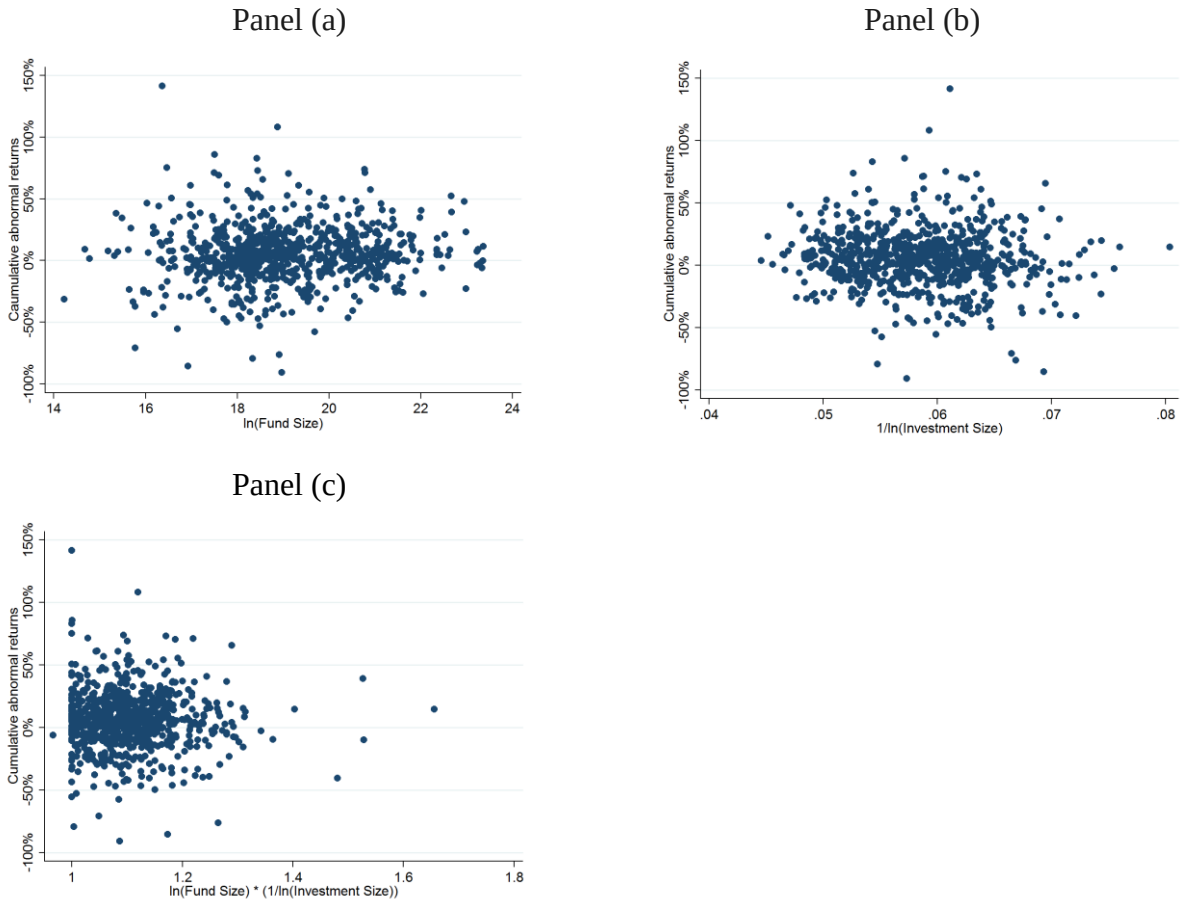
The line plots the average short-term cumulative abnormal return (CAR) for the whole sample in the event window (-20, 20). The event date is defined as the filing date of Schedule 13D, which is marked with the vertical red line. CAR is calculated as the difference between actual returns and predicted returns.

Table 5: Correlation table

		A		B		C
A	ln(Fund Size)					
B	ln(Investment Size)	0.74	(0.00)			
C	Ownership Stake	-0.04	(0.48)	-0.5	(0.14)	

This table contains correlation statistics. P-value is reported within parentheses.

Figure 6: Scatter plots of performance and size variables



Panel (a) plots the CAR versus the natural log of the fund size. Panel (b) plots the CAR versus the inverse of the natural log of the investment size. Panel (c) plots the CAR versus the interaction of (a) the natural log of the fund size with (b) the inverse of the natural log of the investment size.