Hedging their bets: Do hedge fund activists really contribute to long-term value?

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Abstract

Using an international sample of 1,750 hedge fund activist involvements since 2000, we examine whether these engagements cause improvements in long-term firm performance. The central problem addressed in this study is the endogeneity of the activists' decision to engage with the targeted companies. Endogeneity is a critical issue since factors that make companies attractive targets for activism may also be the primary cause of the performance improvements observed following activist interventions. We document systematic differences between companies that are targeted by hedge fund activists and companies that are not. Once these differences are accounted for there is no evidence to support the conjecture that hedge fund activist engagements lead to long-term shareholder wealth creation. In fact, companies targeted by hedge funds could have experienced even more pronounced performance improvements were it not for the activists' involvements.

JEL classification: G32; G38

Keywords: Hedge fund activism, company performance, endogeneity

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1. Introduction

Prior studies such as Brav, Jiang and Kim (2015), Bebchuk, Brav and Jiang (2015), Becht, Franks, Grant and Wagner (2015), Hamao, Kutsuna and Matos (2011), Brav, Jiang, Partnoy, and Thomas (2008), and Greenwood and Schor (2009) show that hedge fund activism can have a positive impact on subsequent company performance. While these studies examine value creation following a campaign they do not address the issue of which firms become targets in the first place i.e. they do not have a model to 'predict' potential targets. A related and equally important issue neglected by these studies is that in their analyses they benchmark company value gains following hedge fund involvement against traditional measures of performance such as industry and index adjusted share price returns or change in accounting measures of performance such as ROA and Tobin's Q. These types of benchmarks are flawed and may not be completely reliable. They do not control for the self-selection or endogeneity bias which arises from the fact that hedge funds select for targets those firms that are most likely to respond to their campaign and thereby generate value. That is to say, the resulting value gains reported by earlier studies, may not be due to the hedge fund intervention at all but due to the inherent characteristics of the targets selected by these hedge funds. This does not mean that the undervalued or underperforming targets would have achieved value enhancement by doing nothing i.e. avoiding the changes that the hedge funds would have imposed on them. It merely means that the managers of the potential target firms might have achieved the changes even absent the hedge funds in their cross-hairs. Since prior studies do not distinguish the value outcomes in the presence of hedge funds from the value outcomes that might have been achieved in the absence of hedge funds (the counter-factual case), the value gains that these studies report cannot be unambiguously and causally attributed to hedge fund intervention and activism alone.

It is therefore necessary to adopt a more robust methodology to correct for the presence of self-selection bias. This paper contributes to the literature on hedge fund activism by adopting a

methodology that accounts for the problem of endogeneity in the analysis of the effect of activist interventions on subsequent firm performance. Endogeneity is likely since hedge fund targets are not randomly selected, i.e., the very characteristics that make companies attractive targets to activist investors e.g. poor strategy or weak governance could also be the factors that render the improvement in subsequent performance likely. That is to say we seek to answer the following question: Would the target company's performance have improved without the hedge fund's involvement (the treatment)?[1] Since the selection of targets for hedge fund intervention is non-random, in estimating the treatment effect we need to isolate the selection bias. In this paper we use a methodology that helps us estimate the treatment effect untainted by selection bias.

To answer the counter-factual question, we estimate the average treatment effect of being targeted by a hedge fund activist. If the process of target allocation to hedge fund activism is exogenous, i.e. contingent upon a group of observable company characteristics, the treatment effect can be evaluated by building a control sample of non-target companies and then by averaging the differences in performance that take place between the target (treatment) and non-target (control) subsamples. We use a recent econometric development in the analysis of average treatment effects created by Abadie and Imbens (AI hereafter) (2006) which involves identifying a control group with the same propensity to treatment as the non-randomly chosen treatment group based on a set of observable characteristics of the members of these two groups. This AI methodology is arguably superior to simpler matching procedures such as the propensity score matching methodology developed by Dahejia and Wahba (2002) owing to the fact that it corrects for the presence of asymptotic bias in simpler matching procedures. This bias arises when the treated and control subsamples are not sufficiently comparable, i.e. the distributions of control variables (hedge fund target characteristics) of the treated and control subsamples are different since in practice the set of observable characteristics may not be exhaustive and the two groups may differ along unobservable dimensions. The control group matched by the AI

[1] In Brav et al (2015), the authors seek to answer this question by comparing the performance outcomes of target firms when hedge fund investors are passive and when they are active i.e. they intend to influence and control the target management. We adopt an approach more directly addressing the endogeneity and self-selection biases.

procedure allows us to estimate the counter-factual performance and the treatment effect in an unbiased manner.

We measure the treatment effect by estimating the buy-and-hold abnormal returns (BHAR) following the announcements of activist involvements to capture the impact of hedge fund activists on the target firms' shareholder wealth. First, we estimate a probit regression model in order to identify a set of target company characteristics that are most likely associated with being a target of hedge fund activism. Our findings demonstrate that the targets of hedge fund activism are indeed different from their peers. Specifically, target companies are undervalued relative to analyst valuations and their peers, they have negative operational performance compared to market expectations, they use cash inefficiently and have low returns on invested capital. Furthermore, hedge fund targets have lower sales growth rates, they invest less in organic growth and have lower dividend yields.

Next, we apply the AI (2006) matching procedure to identify a subgroup of control firms from the control firms used to estimate our probit model with this subgroup having the same propensity to becoming targets as the actual targets themselves. We then estimate the average treatment effects of hedge fund intervention. We find that although the targets of hedge fund activists experience significant performance improvements over the two years following the engagement, these improvements are not necessarily due to hedge fund intervention. The matched control firms perform as well as, indeed better, on the same performance metric. Thus, the counter-factual evidence is that the targets of activist campaigns could have achieved even stronger and more significant performance improvements were it not for the involvement of hedge fund activists. This is evidenced by the significantly negative average treatment effects of BHAR following activist engagements over the five-year period post announcement. That is to say, the average post-hedge fund involvement BHAR to the targets is less than the corresponding average BHAR to the matched (non-target) subsample.

These results are unchanged when the sample of hedge fund targets is broken down into cases when the management of the company did not implement any of the changes proposed by the activists, i.e. activism failed, and cases when the hedge funds succeeded and the proposed changes were implemented. The results are also largely unchanged when the sample is broken down into groups

depending on the type of hedge fund value proposal, i.e. irrespective of whether the activist suggests a change in company governance, strategy or operations, or whether they suggest a single change or multiple changes. Finally, we test the robustness of our results based on the analysis of share price performance by using accounting information following hedge fund engagement. Specifically, we investigate the evolution of company ROE over a period starting five years before and ending five years after each engagement. Our results remain unchanged when we use this alternative metric of company performance.

Our results suggest that hedge funds are good 'stock pickers', i.e. they have the ability to identify companies whose share price performance is likely to improve in any event. The observed improvement in share price performance cannot be attributed to the hedge fund's impact on firm performance. In addition, our analysis shows that the presence of hedge fund activists exerts a negative impact on target companies evidenced by the significantly negative average treatment effect BHAR that we observe over the five-year period following the initial engagement. This detrimental influence could be due to the fact that the changes that activists propose are inappropriate for the given target. It could also be simply because the pressure exerted by the activists' involvement acts as a distraction to the target company's management making it more difficult to achieve the same level of value creation as an identical firm which is not the target of an activist.

The analysis presented in this paper has important policy implications. It serves to show that activists are good stock pickers but they are not good at stimulating underperforming companies to generate value for shareholders. This is relevant to the development of regulatory policies that aim to change the balance of power between company boards of directors and shareholders, such as determining the degree to which directors can be influenced by and are accountable to shareholders, the ability of shareholders to replace directors, determining the rights of short-term investors, disclosure requirements for stock ownership by activist shareholders and regulations which set out the rules by which boards should engage with activist shareholders.

The organization of this paper is as follows. Section 2 provides a discussion of the literature on value effects of shareholder activism, Section 3 provides a description of the data and methodology,

Section 4 presents the results from our empirical analysis and Section 5 summarises our results and provides conclusions and recommendations.

Literature Review

The impact of shareholder activism on firm value has been the subject of academic investigation for over 30 years now. The profile of activists has changed significantly over time. First it was the corporate raiders in the 1980s undertaking hostile and break-up takeovers in an attempt to discipline company management and directors. The regulatory changes of the 1990s saw the rise of activist institutional investors by putting more power in the hands of shareholders and increasing their ability to express their views on voting issues. As a result, earlier studies of activism examined the effect of shareholder proposals on value creation. Such shareholder proposals tended to be of advisory nature only and were not often supported by a majority of company shareholders. In addition, the literature shows that these proposals tended to generate low or no value for shareholders. For example, Wahal (1996) looks at 356 US shareholder proposals between 1987 and 1993 and shows that there is no evidence of significant positive abnormal short- and long-term share price returns following the filing of these proposals. Prevost and Rao (2000) examined 146 governance proposals filed by public pension funds between 1988 and 1994 and reported significant negative wealth impact associated with the announcement of such proposals. The authors used industry and index benchmarks to measure abnormal returns.

More recently the activist arena has been dominated by a different type of activist investors, namely, hedge funds. In the past, hedge funds were frequently the subject of bad press. In the 1990s hedge funds were generally characterised as short term speculators, vultures or 'locusts'. More recently this caricature has been rebutted by empirical evidence showing that hedge funds are more likely to take medium to long term positions in target companies and that through their campaign and engagement with companies these activist investors can bring about value enhancing changes (Becht, et al., 2015 and Bebchuk, et al., 2015). In addition, owing to the higher expenses associated with certain more impactful activist procedures, such as those involving a proxy fight, these procedures tend to be pursued

primarily by hedge funds. According to Gantchev (2013) the use of more effective activist tactics such as proxy votes can be considerably costlier than submitting a shareholder proposal. The author estimates that in the US the average public activist engagement with a proxy fight can result in $10.5 million in expenses, representing approximately two thirds of the total abnormal returns that the average campaign generates. Activist hedge funds tend to also be much more specialised and their portfolios typically consist of 10 to 30 companies while the value of their positions tends to be relatively large (Becht et al., 2015). This approach differs significantly from that of other types of activist investors such as institutional investors who can hold hundreds or thousands of positions in different stocks.

The recent evidence on the effect of hedge fund activists on firm value in the US shows that shareholder returns tend to be enhanced following activist campaigns. For example, Klein and Zur (2008) examine 151 hedge fund campaigns announced between 2003 and 2005 and show that the market reaction around the disclosure (filing of Schedule 13D) date of block share acquisitions by hedge funds is significantly positive and that the positive share price returns tend to persist over a year following the start of the activist campaign. The study uses the Fama-French benchmarking procedure to create size-matched portfolios of firms in order to estimate abnormal returns following the filing of each Schedule 13D. Brav et al. (2008) investigate 882 hedge fund engagements between 2001 and 2006 and report average abnormal returns amounting to 7% during the (-20, +20) days announcement window. The authors also document that the observed positive announcement returns are not reversed during the one-year period subsequent to the activist engagement. Brav et al. (2008) use the Fama-French four factor model to estimate the benchmark for calculating abnormal returns and conclude that since these abnormal returns persist over a period longer than the (-20, +20) days announcement window they cannot be attributed to market overreaction or temporary price pressures caused by higher trading volumes. They therefore attribute the shareholder value gains to hedge fund engagement.

Greenwood and Schor (2009) investigate a sample of 784 hedge fund campaigns that took place during the period 1993 and 2006 and also find significantly positive abnormal returns following hedge fund involvements. However, the authors argue that the documented positive market reaction is caused by the fact that the hedge funds succeed in getting target companies acquired. The benchmark expected

returns in the study are calculated based on the Fama and French (1993) three factor model. Similarly, Zenner, Shivdasani, and Darius (2005) analyse the involvements of 31 hedge funds between 2004 and 2005 and document significant announcement abnormal returns which the authors claim can be primarily attributed to campaigns related to takeover transactions. Bebchuk et al. (2015) use a sample of approximately 2,040 engagements announced between 1994 and 2007 to evaluate the long-term effects of hedge fund activism on company performance. The study measures the buy-and-hold abnormal returns (BHAR) following the activist's disposal of ownership in the target firm using a holding period one month after and ending 36 (60) months after the departure of the hedge fund. Expected returns are calculated using the Fama-French four factor model. The authors report average BHAR amounting to 7.17% (-0.29%). Bebchuk et al. (2015) also examine the effects of hedge fund activism on long-term operating performance by examining the change in firm industry-adjusted ROA and Tobin's Q over a period starting three years before the activist's involvement and ending five years after. The authors estimate the benchmark operating performance by matching companies on the basis of size and age and show that there is no evidence of a negative impact on firm operating performance following the involvement of hedge fund activists. The authors conclude that there is little evidence to support the claim that activists hurt long-term performance through short-sighted "pump-and-dump" trading methods.

Similar to studies which focus on activism in the US, the recent literature on hedge fund activism outside the US demonstrates that activist investors can contribute to shareholder value creation. Becht, Franks and Grant (2010) examine a sample of 362 mostly hedge fund activist involvements in Europe between 2000 and 2008. The authors find significantly positive abnormal returns of 4.4% around the dates of block disclosures. The study also looks at performance differences depending on the outcome of the intervention and finds that the largest abnormal returns are associated with the announcements of restructuring activities such as divestitures and takeovers. Bessler, Drobetz, and Holler (2015) investigate 231 activist engagements in Germany and report that on average activists enhance shareholder value when the effect is evaluated both over the short- and long-term. In line with most US studies, the authors use the Fama-French four factor model to estimate benchmark expected

returns. Hamao, Kutsuna and Matos (2010) examine 916 shareholder proposals submitted primarily by hedge funds in Japan during the period 1998 to 2009 and find that long run shareholder returns are not significantly changed following the submission of such proposals. The authors adopt the buy-and-hold abnormal returns methodology and estimate expected returns on the basis of the Fama-French four factor model. In addition, Kruse and Suzuki (2009) study the impact of one activist investor, Y. Murakami's and a number of his aggressive activist funds. The paper provides evidence of large positive BHAR adjusted using the Fama-French four factor model.

Becht et al. (2015) analyse an international sample of 1,740 activist involvements between 2000 and 2010 and find that activist interventions with outcome result in average calendar time portfolio returns of 8% while interventions without outcome result in 2.3% returns when using the Fama-French four factor benchmark over a period starting in the month of outcome announcement and ending when the hedge fund disposes of its position the target company. The authors conclude that the involvement of hedge funds can lead to positive alpha but that the size of returns is contingent upon the activist achieving the desired outcome form the intervention. The authors suggest that there is uncertainty surrounding the likelihood that the hedge funds will succeed and that the announcements of the outcomes serve to resolve this uncertainty. Becht et al. (2015) also show that the cumulative abnormal returns around outcome announcements can vary dramatically depending on the type of outcome that the hedge fund achieves. The study documents that, measured over a (-20, +20) days event window, interventions resulting in takeovers can generate 9.7% returns, other forms of restructuring can result in 5.6% returns, changes to boards can result in 4.5% returns, while changes to payout policies generate -0.2%.

Two of the most recent studies of the effect of hedge fund activism on company performance incorporate tests that attempt to address the endogeneity issues associated with the analysis of hedge fund engagements. Brav et al. (2015) examine the hypothesis that the target frim would have experienced an improvement in performance even in the absence of an involvement by a hedge fund(s). Specifically, the authors use a difference-in-difference regression analysis to test this hypothesis with the use of a sample of both target and non-target companies. Brav et al. (2015) use plant-level data from

the US Census Bureau to estimate the Cobb-Douglas production function with the following independent variables: net capital stock, labour input and material costs. Additional control variables used by the authors include segment and firm size as well as plant age. The authors show that target companies experience improvements in production efficiency during the three years following engagement. In this study, we argue that target companies have a variety of financial characteristics (not just productivity levels, size and age) that are significantly different from those of non-target companies. Examples of such financial characteristics are firm valuation, liquidity, leverage, and growth. We believe that it is necessary to account for these key financial characteristics in order to provide a more direct and reliable method for dealing with endogeneity. We implement the Abadie and Imbens (2006) matching procedure (described later in the study) in order to perform this more direct and reliable technique of tackling endogeneity. This methodology also allows us to use a sample which consists of companies which belong to non-manufacturing as well as manufacturing industries.

It is worth noting that Brav et al. (2015) adopt a second method to deal with the problem of endogeneity. They separate their sample into 'passive' and 'active' engagements. Active engagements are defined as cases where there is evidence that the hedge fund has actively communicated with management regarding company strategy, i.e. they intend to influence and control the target management. To identify these 'active' engagements Brav et al. (2015) examine cases where the hedge fund changed its filing status from a Schedule 13G filing to a schedule 13D filing. This change is legally required in order to provide a given hedge fund with the ability to take actions to impact corporate control. We note that this analysis is based on a limited sub-sample from all the hedge fund engagements, 299 out of approximately 2,000. In this paper, we adopt an approach more directly addressing the endogeneity and self-selection biases which allows us to perform the analysis on all targets of hedge fund activism for which key financial information is available.[2] Brav, Jiang, Ma, and Tian (2016) examine the effect of hedge fund intervention on corporate innovation with the use of a similar methodology to that in Brav et al. (2015). Specifically, the authors show that although R&D

[2] Please refer to the Data and Methodology section for further details.

expenditure decreases following hedge fund engagement, companies experience and increase in patent counts and citations.

To sum up most recent studies show that the involvement of activist investors can generate positive short and long-term shareholder returns. However, this evidence is based on measures of wealth creation that do not account for the fact that the targets of hedge fund activists are inherently different from non-target firms. As a result, we argue that the findings of previous studies may be contaminated owing to the presence of self-selection and/ or endogeneity bias. That is to say, the observed improvement in post engagement performance could be due to the fact that hedge fund targets are systematically different from non-targets and that the improvement in performance would have taken effect irrespective of the activist's engagement. The very factors that attract hedge fund activists to certain companies may also be the factors that drive the observed increase in shareholder value creation following intervention. This motivates the central hypothesis of this study:

H1: Hedge fund activism adds value to target firm shareholders

If hedge funds have the ability to add value through their interventions, there will be significant gains from hedge fund activism over and above the gains enjoyed by non-target firms who otherwise resemble hedge fund targets. In order to test this hypothesis, we estimate the treatment effects associated with being targeted by a hedge fund activist. In the context of hedge fund activism treatment corresponds to becoming the target of an activist engagement. We use the treatment effect estimator developed in Abadie and Imbens (2006). This methodology allows us to determine whether the positive effect of hedge fund activists would still exist after we control for the fact that the assignment to the 'treatment' is conditional on the group of characteristics that make companies attractive targets for hedge fund activism.

2. Data and Methodology

3.1 Data

We construct an international database of exchange-listed targets of hedge fund activism which covers all engagements announced in the period January 2000 – December 2014. Our sample of hedge

fund engagements is obtained from a number of different sources. First, we identify US hedge fund involvements by looking at Schedule 13D filings to the Securities and Exchange Commission (SEC). This type of filings is a legal requirement for any investor who holds 5% or more of a firm's shares and who intends to impact corporate control. We merge this database with the data provided by Thomson One Banker on activist interventions which covers international engagements by activist investors. We also had access to the data on US hedge fund activism created by Brav et al. (2015), covering the period between 2000 and 2011. To identify the purpose of each hedge fund engagement we examine the 13D filings and other filings provided by Thomson One Banker. We also perform news searches to substantiate and complement the data obtained from company filings where necessary. Our final sample consists of 1,750 activist interventions. Table 1 provides a breakdown of our sample per year (Panel A), country (Panel B), region (Panel C) and industry (Panel D). We observe a steady increase in activist engagements until 2012 which is followed by a considerable drop in 2013-2014. The top three countries with highest number of interventions are the US (1,465), United Kingdom (94), and Canada (81) and taken together these countries account for approximately 94% of the interventions in our sample. Table 1, Panel D shows that companies which operate in the financials, technology and consumer services sectors are most likely to be targeted by hedge fund activists, with 20.3%, 17.1%, and 15.3% of activist interventions in our sample being accounted for by each of these industries respectively.

[Please Insert Table 1 about here]

Table 2, Panel A provides a breakdown of our sample per intervention outcome. We distinguish between *Completed* hedge fund involvements, where we were able to identify the outcome of the involvement by examining SEC and similar filings as well as performing news searches, and involvements where the outcome is yet to be determined (*Outcome Pending*). We further investigate the completed engagements to identify those where the hedge fund was successful in achieving some or all of the proposed changes (*Hedge Fund Victory*) and those where the company managed to avoid having to implement any of the proposed changes (*Management Victory*). It is interesting to note that the hedge funds appear to be successful more often than management. If we consider the *Completed* interventions only, hedge funds were successful in achieving some or all proposed changes in

approximately 60% of the time (863/1,447) while management was able to resist having to implement any changes in the remaining 40% of the time (584/1,447).

[Please Insert Table 2 about here]

Table 2, Panel B shows the breakdown of our sample per engagement type. This table is based on the subsample of hedge fund involvements that we define as *Hedge Fund Victory*. We group the outcomes in four broad categories depending on the type of change that the hedge fund was proposing: a) *Governance* related change, where the hedge fund seeks to obtain board representation, improve shareholder rights, change company management or management's compensation, etc., b) *Strategic Direction* related change where the hedge fund is challenging the status quo of the firm without proposing any specific guidelines on how to achieve the change, c) *Restructuring* related change where the proposed change is related to performing a spin-off, partial or full sale of the company's assets, and d) *Other* types of proposed change that do not fall into the three broad categories presented above. It should be noted that the sum of engagement types is higher than the total number of *Completed* hedged fund interactions. This is due to the fact that in some cases the hedge fund can propose a number of changes that fall into more than one of the categories that we have created. We note that the largest proportion of engagements involve *Governance* related changes (75.2%), followed by *Strategic Direction* related changes (13.0%), and *Restructuring* related changes (8.1%).

2.2. Measures of post activist-engagement performance

We use the event study methodology to measure the short term wealth effect associated with the announcements of hedge fund engagements. Following Weston, Mitchell, and Mulherin (2004), and in the spirit of Brown and Warner (1985), we present results for the market-and-risk-adjusted abnormal returns to shareholders of the targeted firms. Abnormal returns are defined as the difference between the actual returns and the expected returns, with the latter measured by the target company's local stock market index or industry index. Daily returns are computed as the percentage price (or index) changes on two consecutive trading days. We use a 240-day estimation period prior to the beginning of the event period. Cumulative abnormal returns (CARs) are estimated for a number of different event windows

surrounding the engagement announcement, such as (-1, +1), (-2, 2), (-10, 10), and (-20, 20). Following Eckbo (1983), Song and Walkling (200) and Shahrur (2005) we use equally-weighted portfolios of companies to measure the CARs which accrue to the targets of hedge fund activists. The latter methodology controls for the possibility that the CARs are contemporaneously cross-correlated. The statistical significance of the abnormal returns is tested using the methodology in Mikkelson and Partch (1988) and Shahrur (2005).

We measure long-term value creation on the basis of company share price returns using the buy-and-hold abnormal returns (BHAR) which accrue to companies over different event windows such as (t-1m, t+12m), (t-1m, t+24m), (t-1m, t+36m), (t-1m, t+48m), and (t-1m, t+60m).[3] The BHAR approach to measuring abnormal returns has been widely used in studies involving share price performance (see, e.g., Barber and Lyon, 1997 and Mitchell and Stafford, 2000). Mitchell and Stafford (2000) define BHAR as "the average multiyear return from a strategy of investing in all firms that complete an event and selling at the end of a pre-specified holding period versus a comparable strategy using otherwise similar non-event firms." An advantage of using BHAR is that this approach to measuring company share price performance is closer to investors' actual investment experience compared to the periodic rebalancing which other approaches to share price performance analysis involve. The BHARs are equally weighted and adjusted to the performance of the respective Datastream local index or MSCI industry index of each company over the same period. In order to test the robustness of our results based on the analysis of share price performance we also measure performance using accounting information following hedge fund engagement. Specifically, we investigate the evolution of company ROE over a period starting five years before and ending five years after each engagement.

2.3. Treatment effect estimation

Having identified a set of appropriate predictors of the likelihood of being targeted by a hedge fund activist, we use the Abadie and Imbens (2006) matching technique to evaluate the 'average treatment

[3] Note that the BHAR analysis uses the total returns of a company, i.e. it includes share price appreciation or depreciation as well as the return from reinvesting the paid dividends.

effect' from becoming the target of an activist intervention. According to Colak and Whited (2007), this matching procedure is superior to the other methods such as the propensity score matching (PSM) (Dahejia and Wahba, 2002) and the Heckman bias adjustment procedure (Heckman, 1987) since it does not involve any parametric assumptions regarding the distributions of the variables. Relaxing such assumptions is particularly important when using income and balance-sheet statement items because the distribution of these line items is not accurately captured by the logistic or normal distributions which are the two distributions assumed by the PSM and Heckman matching methods.

We now discuss the general methodology of obtaining consistent treatment effects estimates here. Let T be a variable which takes the value of one if a company is targeted by an activist hedge fund and zero otherwise. Let $S_n(T)$ be the level of the share price or total returns index as a function of T for observation *n*. Using this notation, $E(S_n(1)|\, T = 1)$ represent the expected effect of being targeted by a hedge fund activist (the treatment) on the group of hedge fund targets (treated group). Likewise, $E(S_n(0)|\, T = 1)$ represents the 'counterfactual' expected effect of not being targeted by a hedge fund activist, given that the firm experienced hedge fund involvement (i.e. treatment took place). In our analysis we examine the change in $S_n(T)$ relative to its level before the hedge fund involvement, which is denoted as $\Delta S_n(T)$. By taking the change in the share price or total returns index we are able to control for time-invariant and unobservable differences between the target (treatment) and non-target (control) subsamples. This procedure is similar to differencing to remove fixed effects in a panel dataset. We estimate the average impact of becoming an activist target on company performance for a group of companies that were targeted by activist hedge funds, i.e. the average treatment impact on the treated:

$$\theta|_{T=1} \equiv E(\Delta S_n(1) - \Delta S_n(0)|T = 1 \quad (1)$$

Since we cannot directly measure the effect of both being targeted by an activist hedge fund and not being targeted by a hedge fund on the same company, $E(\Delta S_n(0)|\, T = 1)$ represents a hypothetical event that cannot be observed. The recent studies on the impact of hedge fund activism on company performance have measured:

$$E(\Delta S_n(1)|\, T = 1) \quad (2)$$

i.e. performance is estimated by averaging the difference in share price or total return index for targeted companies before and after hedge fund involvement. The problem with this method is that equation (2) is a biased estimator of equation (1), in any case apart from when $E(\Delta S_n(0)|\, T = 1) = 0$. The latter situation would happen if the companies that were targeted by hedge funds would not have experienced any change in performance in the absence of the activist's involvement. This condition would only be true if hedge fund involvement is the sole way to enhance share price performance or if the targeted companies have no other characteristics that impact share price performance. The first requirement is false and the second one is a matter that can be determined empirically.

Since we cannot observe $\theta|_{T=1}$ we need to make certain assumptions in order to estimate the unobservable part of the function: $E(\Delta S_n(0)|\, T = 1)$. The typical assumption in the treatment effects literature is that allocation to treatment is random, dependent on a group of observable pre-treatment characteristics (i.e. observable variables that distinguish between hedge fund targets and non-targets), Z. Simple matching procedures use this assumption by assigning each treated observation to one or more untreated observations with similar pre-treatment characteristics, Z to the control group corresponding to an observation in the treatment group. Then, $E(\Delta S_n(0)|\, T = 1)$ is estimated by taking the average of $\Delta S_n(0)$ over the matches (control subsample). This makes it possible to obtain an estimate of $\theta|_{T=1}$ by taking the difference between $\Delta S_n(1)$ and estimate of $E(\Delta S_n(0)|\, T = 1)$. This type of treatment effect estimation is usually performed without replacement (see, for example, Rubin, 1973 a, b; Rosenbaum, 1989, 1995; and Dahejia and Wahba, 1999) although Roberts and Whited (2013) recommend with replacement. The matching procedure aims to remove the selection bias and allows the unbiased estimation of the treatment effect.

There are two important differences between the simple matching procedures described above and the Abadie and Imbens (2006) procedure which are related to the fact that simple matching estimators are asymptotically biased when the vector of company characteristics Z contains more than one variable. When the matches of treated and non-treated observations are not exact the treatment effects estimator is asymptotically biased. The first difference is the introduction of matching with replacement in order to minimise the asymptotic bias and the second difference is the estimation of a

term that corrects for the bias. The bias correction is only necessary for the estimate of $E(\Delta S_n(0)|\, T = 1)$ as the term $E(\Delta S_n(1)|\, T = 1)$ can be observed directly. The bias correction is an estimate of the difference between two components. The first component is the impact of treatment on the control subsample with perfect matching. The second component is the actual impact of treatment on the control subsample. To obtain these two terms it is necessary to estimate the conditional expectation of $\Delta S_n(0)$ given Z_n which is given by regressing $\Delta S_n(0)$ on Z_n on the basis of the control subsample. To estimate the conditional expectation, we need to take $\widehat{\omega_0}(Z_n) \equiv \widehat{\beta_0} + \widehat{\beta_1} Z_n$, where $\widehat{\beta_0}$, a scalar, and $\widehat{\beta_1}$, a vector with the same dimension as Z_n, are the estimated coefficients from the regression. The bias corrected estimate of $E(\Delta S_n(1)|\, T = 1)$ is equal to the simple regression estimate presented above plus a component which we denote as $\widehat{\omega_0}(Z_n) - \widehat{\omega_0}(Z_i)$. This component is defined as the difference between the predicted values of $\Delta S_n(0)$ using a group of controls for the nth treated observation and the group of controls for its associated match, indexed by *i*.

Next, we estimate the treatment effects for each of our performance variables, i.e. the control sample-adjusted results. Specifically, we define the variable *Diff. in Diff. Treatment Effects BHAR* as the difference between the average BHAR which accrue to investors in target and non-target companies. Using $BHAR_{t\text{-}1m \text{ to } t+12m}$ as an example, the variable *Diff. in Diff. Treatment Effects* $BHAR_{t\text{-}1m \text{ to } t+12m}$ shows the average value of:

$$(\text{BHAR}_{\text{t-1m to t+12m}} \text{ for each target company} - \text{BHAR}_{\text{t-1m to t+12m}} \text{ for each matched control company}) \quad (3)$$

Whenever the variables *Diff. in Diff. Treatment Effects BHAR* or *Treatment Effects ROE* are significantly greater than zero, we interpret this result as an indication that the given improvement in performance is not necessarily driven by the hedge fund engagement per se.

2.4. Probit model of likelihood of being HF activist target

To construct a control sample of firms, we need to identify firms with a profile similar to those of actual targets and which have the propensity to becoming targets as the actual ones. This requires modelling the propensity i.e. constructing a predictive model of hedge fund targets. With such a model

we can estimate the probability of being targets and identify the control firms which have the same propensity as the actual targets. This allows us to match the actual targets to the control firms whose performance is a measure of the counterfactual performance absent hedge fund intervention. We therefore estimate a probit model of hedge fund targeting using a sample of actual targets and a control sample. We identify a set of firm characteristics that are associated, *a priori* or from prior empirical studies, with hedge fund targeting for intervention. We refer to these characteristics as 'predictor' variables.

In their study, Abadie and Imbens (2006) highlight the importance of matching on the basis of more than one or two control variables such as industry and size.[4] Therefore, we first identify a comprehensive group of predictor variables that will allow us to estimate reliably the probability of becoming a target of hedge fund activism. As a first attempt to determine whether endogeneity is an issue, we perform simple univariate analysis on the basis of our two subsamples: the subsample of targets and the subsample of controls. The results are presented in Table 3. Panel A (Panel B) shows mean and median comparison tests of unadjusted (industry-adjusted) financial characteristics between the group of target firms (Group A) and group of control firms (Group B). Not surprisingly Table 3 reveals that target firms are significantly different from non-target firms in terms of relative size, payout policy, operational performance and leverage. These systematic differences between the target and control groups confirm the fact that it is important to control for the issue of endogeneity when examining the effect of activist on company performance.

[Please Insert Table 3 about here]

We then estimate a probit regression model to predict the likelihood of becoming a target to hedge fund activism. Table 4 displays the results of our probit regression analysis. We estimate two probit models: one based on unadjusted financial characteristics (Model 1) and one based on industry-

[4] Several studies in corporate finance have drawn control firms by matching on industry and size. This procedure is rather ad hoc and not as rigorous as the matching procedures we have discussed including Abadie and Imbens (2006).

adjusted financial characteristics (Model 2). The table reports both the regression coefficients and the marginal probability change caused by a one standard deviation change in each independent variable from its respective average.

[Please Insert Table 4 about here]

Brav et al. (2008) and Greenwood and Shor (2009) report that hedge funds are likely to target smaller companies since the larger the target, the larger the initial capital investment that is necessary in order to obtain a sizeable stock holding in the target that would allow the hedge fund to exert any meaningful influence. In addition, buying a significant stake in any large company could increase the exposure of the activist's portfolio to idiosyncratic risk that may be too large even for a hedge fund. We use the market capitalisation of companies measured one year before the announcement of the hedge fund involvement in order to account for the effect of company size. The results presented in Table 4 (Models 1 and 2) show that the variable *Market cap.* has a negative and statistically significant coefficient which is in line with the findings of previous studies.

Brav et al. (2008) and Greenwood and Shor (2009) also show that hedge fund activists are likely to be 'value investors', i.e. they tend to invest in companies with low market-to-book ratios. We also control for this effect in our probit regression. Our analysis shows that the unadjusted variable *Market to book* has significantly negative coefficient (Table 4, Model 1) while the industry-adjusted variable is not statistically significant (Table 4, Model 2). Furthermore, according to Brav et al. (2008), Bessler et al. (2015), Park and Marchand (2015) the degree to which the hedge fund activist perceives a given company to be undervalued is an important determinant of hedge fund's choice to engage with a given company. We employ a number of different variables to measure a given company's degree of undervaluation, such as the ratio of price to free cash flow (variable name *Price to free cash flow*), the forward price earnings ratio (variable name *Forward P/E ratio*), as well as the difference between each company's share price and the broker target price (variable name *Undervaluation*). Our results confirm the expectation that the targets of hedge fund activist are more likely to have a higher level of perceived undervaluation. This is indicated by the significantly negative coefficients that correspond to the variable *Forward P/E ratio* and *Undervaluation*. Interestingly, while the coefficient associated with the

Price to free cash flow variable is insignificant in Table 4, Model 1, it loads with a significantly positive coefficient when we use industry adjusted values (Table 4, Model 2). The latter finding could be due to the fact that the forward price to earnings ratio and the gap between a company's share price and the analyst's target price are measures that capture more accurately the degree of perceived undervaluation.

Among the main objectives of activist hedge funds are to improve the strategies and operations of target firms. As a result, it is expected that the targets of activists are likely to have poor measures of operational performance (Brav et al., 2008; Greenwood and Shor, 2009; Bessler et al., 2015). We account for this effect by including a measure of the annual sales growth of the target company during the three years before the announcement of the activist engagement (variable name *Sales growth (3-year)*). In addition, we include a measure of the firm profitability given by the return on capital employed as of one year before the intervention (variable name *ROIC*). In line with our a priori expectation both measures of operating performance load with significantly negative coefficients in our probit regressions (Table 4, Models 1 and 2).

Brav et al. (2008) and Klein and Zur (2009) show that target firm's capital structure is different from that of non-targets. This argument is related to Jensen's (1986) 'free cash flow hypothesis' according to which company management uses the excess cash flow to increase the size of their firm beyond the level that would be considered optimal to secure their own personal interests rather than the interests of their principals – the shareholders. Managers may thus be motivated to amass cash in order to be able to grow the company. Jensen (1986) also suggests that agency costs of free cash flow are negatively associated with company leverage as the interest payments associated with high leverage would decrease the amount of free cash flow. Jensen's theory suggests that hedge fund targets are likely to be cash rich and have low levels of leverage on their balance sheets. We control for this difference between targets and non-targets by including a measure of company liquidity given by the ratio of cash to total assets (variable name *Cash_TA*). We also measure firm level of indebtedness by the ratio of net debt to market capitalisation (variable name *NDebt_MCap*). Although the coefficients corresponding to *Cash_TA* are insignificant in both models, the coefficient corresponding to *NDebt_MCap* is

significantly negative which is in line with the expectation that the degree of indebtedness is inversely related to the likelihood of becoming the target of hedge fund activism (Table 4, Models 1 and 2).

Brav et al. (2008) as well as Klein and Zur (2009) show that target companies' dividend yield tends to be lower compared to their non-target peers. To capture this difference in payout between targets and non-targets we include the dividend yield of firms as an explanatory variable in our probit model (variable name *Div_yield*). Our results confirm the findings of previous studies since the coefficients corresponding to the variable *Div_yield* are significantly negative (Table 4, Models 1 and 2).

Following Klein and Zur (2009) we also account for the amount of capital companies invest for the purpose of organic growth. We use the ratios of capital expenditures to sales as well as research and development to sales in order to capture this effect (variable names *Capex_sales* and *R&D_sales* respectively). Both variables load with insignificant coefficients in our probit models (Table 4, Models 1 and 2).

Greenwood and Shor (2009), Bebchuk et al. (2015), and Park and Marchant (2015) emphasize that target companies tend to underperform their industry in the years before the activist engagement. We measure the relative performance of companies by calculating the three-year growth in the total returns index for each company before the activist's engagement (variable name *Tot.Return (3-year)*). We also include a measure of the earning per share outcome for each company relative to analyst consensus estimates, this variable captures the degree of 'earnings surprise' associated with the given company and a negative operational performance relative to market expectations would suggest that operational improvements could be available (variable name *Earnings surprise*). Not surprisingly both measures of company performance load with significantly negative coefficients indicating that activists tend to target companies that underperform relative to their peers (Table 4, Models 1 and 2).

Following Hamao et al. (2010) we also control for the liquidity of the shares of companies by including the variable *Turnover* in our probit regression. *Turnover* is measured as share volume divided by adjusted shares outstanding. Our results show that the variable *Turnover* is positively and

significantly related to the likelihood of becoming a target to hedge fund activism (Table 4, Models 1 and 2). This finding suggests that high trading volume is crucial in order to allow the activists to accumulate the necessary number of shares in a short period of time. This is because the actions of some activists are followed by other investors and these other investors could drive up the cost of amassing the necessary ownership stake that would enable the activist to exert influence on company management. Stocks that are characterised with high trading volume make it easier for the activist to acquire a significant ownership position before other, tag-along investors.

Following Becht et al. (2015) we also account for the percentage of shares that are owned by company insiders (variable name *Closely Held Shares*). This variable loads with a significantly negative coefficient in both probit models presented in Table 4. This results could be explained by the fact that the larger the stake owned by company insiders the more difficult it is for the activist hedge fund to exert any influence on company management and achieve change. According to Park and Marchant (2015) activist hedge funds are considerably less likely to pursue proxy solicitation tactics in order to obtain board representation when company insiders hold more than 25% of shares outstanding.

3. Empirical Analysis

4.1 Short-term wealth effects from hedge fund activism

Table 5 reports the results from the analysis of the cumulative abnormal returns generated by the targets of hedge funds around the announcement of the hedge fund's involvement. The results are broken down per engagement outcome, namely, we show the results for a) all announced interventions, b) *Completed* interventions where the hedge fund disposed of its investment in the target company and the outcome was either that the demands of the hedge fund activist were partially or fully met or that the company's management was able to avoid implementing the proposed changes, c) *HF Victory* where the hedge fund's demands were partially or fully met, and d) *Management Victory* where the company's management was able to avoid implementing the proposed changes. In addition, Panel A reports the cumulative abnormal returns where the benchmark is the local market index of the target company while Panel B displays the results where the benchmark is the target's industry index. Overall, our

results show that the market perceives positively the announcement of a hedge fund activist engagement. This result is consistent across the different event windows that we look at, in fact what we observe is that the cumulative abnormal returns increase with the size of the event window. In addition, the significantly positive abnormal returns are observed for both types of benchmark that we use to calculate the abnormal returns. The magnitude of the CAR for the (-20, +20) window are very similar to those reported in previous studies such as Becht et al. (2015) and Bebchuk et al. (2015). Specifically, the CARs for the (-20, +20) event window are all positive and statistically significant and amount to 7.6% (6.1%) for all announced interventions, 7.3% (7.6%) for the completed interventions and 7.7% (8.0%) for the cases when the hedge fund was partially or completely successful based on the local (industry) index benchmark. These results suggest that investors believe that the hedge fund's engagement will lead to an increase in the share price and an improvement in operational performance.

[Please Insert Table 5 about here]

It should be noted that the short-term market reaction to the announcement of engagements could in fact underestimate the effect of the anticipated performance improvement. According to Brav et al. (2008) there would be no reason for hedge funds to keep their stock holding in the target firm and endeavour to achieve the changes they perceive essential in order to enhance value if the initial stock price reaction to the announcement of engagement fully reflected the entire expected benefit from activism. However, what we observe is that hedge funds tend to hold their stake in the target firm and engage in activism (Brav et al., 2008). In fact, the CAR associated with the event reflects the expected value improvement multiplied by the likelihood that the hedge fund succeeds in implementing the proposed changes (Bessler et al., 2015). The target firm's share price is expected to change further following the event in order to reflect whether the hedge fund manages to convince the target's management to perform the proposed changes. Interestingly, our results appear to indicate that the market can evaluate relatively accurately the chances of hedge fund success. This is because the CARs for the cases when management successfully resisted the hedge fund's intervention become insignificant as the event window increases, i.e. the CARs for the (-10, +10) and (-20, +20) event windows are not statistically different from zero while the CARs for the cases when the hedge fund was

successful are positive and statistically significant over the same event windows irrespective of the type of benchmark used.

Table 6 presents the CARs associated with the announcement of hedge fund intervention broken down per type of engagement. Specifically, we distinguish between engagements where: a) *Strategic Direction*, i.e. the proposed change is related to the strategic direction of the firm, i.e. the activist is challenging the status quo of the firm without proposing any specific guidelines on how to achieve the change, b) *Governance*, i.e. the proposed change is related to the firm's governance, i.e. the activist proposes changes at the board or senior management level as well as other changes that involve increasing the influence of shareholders, c) *Restructuring*, i.e. the proposed change is related to restructuring the firm, i.e. performing a spin-off, partial or full sale of the company's assets, and d) *Other*, i.e. the proposed change does not fall in any of the three broad categories described above. Similar to Table 5 we report the CARs based on the local index benchmark (Panel A) and industry index benchmark (Panel B). It should be noted that the CARs reported in Table 6 are based on the subsample of engagements where the hedge fund was partially or fully successful at having its demands met by company management. Overall, our results are similar to those reported in Becht et al. (2015), Klein and Zur (2009), and Greenwood and Shor (2007). We show that the type of engagements that generates the most sizeable CARs are those related to restructuring, i.e. when the hedge fund proposes a spin-off, partial or complete sale of the firm. Over the (-20, +20) days window the restructuring related interventions result in significantly positive returns that amount to 17.2% (16.8%) when benchmarked against the local (industry) index. The second largest CARs are associated with governance or strategic type interventions, with the (-20, +20) CARs amounting to 7.0% (7.3%) and 6.8% (7.6%) respectively when the benchmark used is the local (industry) index. Other types of engagement have CARs equal to 5.9% (7.2%0 when benchmarked against the local (industry) index. These results imply that activists contribute most to value creation when they manage to successfully break up the business or have it taken over by another firm.

[Please Insert Table 6 about here]

The event study results discussed above are consistent with the inference that the capital market expects that the intervention of the activists will contribute to better operating and share price performance in the future. Nevertheless, it is possible that the CARs that we obtain are a mere reflection of temporary shifts in share prices instigated by the microstructure effects or buying pressure. If the positive CARs are caused by trading patterns instead of the release of new positive information about anticipated improvement in company value, these CARs should not persist (i.e. be reversed) over longer periods following the initial hedge find involvement. Furthermore, it is also plausible that investors have overreacted to the announcement of the activists' interventions and this is more likely to happen when the hedge fund adopts more aggressive tactics. For these reasons, it is necessary to examine the longer term effects of hedge fund activism in order to determine whether the initial market reaction is a sheer manifestation of trading patterns or expected wealth gains from the activism.

4.3 Long-term wealth effects from hedge fund activism

We now proceed to investigate the principal question of whether hedge funds cause improvements in shareholder wealth over the long term. Table 7 presents our replication of the analysis of previous studies albeit for a different sample and time period. We also compare these replicated results to the treatment effects estimated following the Abadie and Imbens (2006) methodology. The first section of Table 7 summarizes the change in BHAR over different time periods before and after the hedge fund engagement. The change in BHAR after the hedge fund engagement represents the estimate of the quantity $E(\Delta S_n(1)|\, T = 1)$. The second section shows the 'difference-in-difference' treatment effects represented by $E(\Delta S_n(1) - \Delta S_n(0)|T = 1$, that is to say the average BHAR for the targeted group of firms relative to the control group. By examining the difference-in-difference estimator we can eliminate the effect of unobservable and time invariant control variables.

[Please Insert Table 7 about here]

The first section of Table 7 repeats the qualitative conclusions of Klein and Zur (2009), Bessler et al. (2015), Becht et al. (2015), and Bebchuk et al. (2015). It should be noted that the conclusions are not exactly the same most likely owing to the fact that our sample differs from the samples used by

these previous studies. Specifically, in line with Bebchuk et al. (2015) we find that the targets of hedge fund activists tend to underperform during the period before the engagement. This is evidenced by the negative and statistically significant BHAR calculated during periods spanning (-36, -1), (-24, -1), and (-12, -1) months before the hedge fund involvement irrespective of the benchmark used. For example, we find that the target firms of all announced engagements significantly underperform their market and industry peers, by 11.8% and 14.5% respectively, over the period starting 24 months before and ending 1 month before the hedge fund's engagement.

Furthermore, we observe that the BHAR generated following the activists' intervention tend to be either positive and statistically significant or insignificantly different from zero. In particular, we find that the average BHAR for completed engagements is equal to 4.6% (5%) and the average BHAR for engagements where the hedge fund succeeded in its endeavours to implement changes is equal to 4.1% (5.9%) when benchmarked against the local index (industry index) peers over the period starting 1 month before and ending 24 months after the hedge fund's engagement. These wealth effects are similar to the results reported in Klein and Zur (2009), Bessler et al. (2015), Becht et al. (2015), and Bebchuk et al. (2015). Moreover, these findings indicate that improvements in shareholder wealth creation accompany interventions of hedge fund activists and that the observed short-term value gains generated by the announcements of engagements cannot be attributed to trading patterns or investor overreaction. However, in order to infer causation from hedge fund activism to shareholder wealth creation it is necessary to estimate the treatment effects associated with this event.

The final section of Table 7 shows the results from the analysis of the difference-in-difference treatment effects. Most of the estimated treatment effects are either significantly negative or insignificantly different from zero. These results are consistent across different types of outcomes (i.e. irrespective of whether the hedge fund succeeds or not), different lengths of estimation periods and different types of benchmarks. These findings emphasize the importance of accounting for unobservable and time-invariant control variables. More crucially, these findings reveal that $E(\Delta S_n(0) | T = 1) \neq 0$. We also compare the change in BHAR following hedge fund engagement to the change in BHAR before hedge fund engagement. What we observe is that although the targets of

hedge fund activists underperform in the period before the activists' involvement, the degree of underperformance worsens following the activists' intervention. This is particularly the case over the longer, (-1, +24), (-1, +36), (-1, +48), and (-1, + 60) time windows. These results demonstrate that companies which become the targets of hedge fund activists are truly different from their peers that do not, and it is this difference that causes the observed change in shareholder wealth rather than the hedge fund activism per se.

The above results are largely confirmed when we breakdown the analysis of the long-term wealth effects of hedge fund activism per type of engagement. The results are summarized in Table 8. Similar to the analysis presented in Table 6, we distinguish between engagements where: a) the proposed change is related to the strategic direction of the firm, i.e. the activist is challenging the status quo of the firm without proposing any specific guidelines on how to achieve the change, b) the proposed change is related to the firm's governance, i.e. the activist proposes changes at the board or senior management level as well as other changes that involve increasing the influence of shareholders, c) the proposed change is related to restructuring the firm, i.e. performing a spin-off, partial or full sale of the company's assets. In addition, Panel A presents the average BHARs adjusted to the corresponding market index while Panel B shows the average BHARs adjusted to the corresponding industry index. We focus on the treatment effect results. It appears that, in most cases, the long-term performance of hedge fund targets is either significantly worse or not significantly different from the long-term performance of similar companies that were not the targets of hedge fund activism. For example, when benchmarked against the local index, engagements related to governance or restructuring changes generate significantly negative BHAR amounting to 23.7% and 11.8% respectively over the period starting 1 month before and ending 60 months after the announcement of the engagement. In addition, when benchmarked against the corresponding industry index, the targets of hedge fund activists experience average BHAR returns that are not significantly different from those experienced by the matched control firms over the period starting 1 month before and ending 60 months after the announcement of the engagement. The latter result holds for strategic direction, governance and restructuring type

engagements which generate negative but statistically insignificant average BHAR equal to -7.2%, -15.8%, and -2.0% respectively during that period.

[Please Insert Table 8 about here]

Tables 9 and 10 repeat the analyses presented in Tables 7 & 8 using return on equity (ROE) as the performance metric adjusted to index (Panel A) and industry (Panel B) peers. We focus on the results presented in the third section of each table since they show the treatment effect estimates. We find that hedge fund targets consistently underperform their index and industry peers during the first two years following the involvement. These results are unchanged when we split the sample into cases when the hedge fund was successful and cases when the company's management was successful. The results are also unchanged when we examine the different types of engagements.

[Please Insert Tables 9 & 10 about here]

In sum our results suggest that the shareholder wealth improvement experienced by the targets of hedge fund activism that is documented by previous studies is not caused by the hedge fund intervention per se. Instead, it merely demonstrates the activists' ability to choose companies whose shareholder wealth is expected to improve in any event. As a result, we conclude that the observed wealth creation is evidence of the hedge fund's 'stock picking' skills rather than their ability to contribute to long-term value creation by inducing companies to implement the proposed changes. What is more, our results also point to the fact that when compared to the performance of companies with similar characteristic that were not targeted by hedge funds, the activist targets appear to perform worse. These findings indicate that the hedge funds' engagement exerts a detrimental effect on company management by either disturbing the normal operations of the business or proposing changes that are not appropriate given the specific circumstances/characteristics of the targets.

4. Conclusion

In writing this paper we have sought to gain a deeper understanding of the sources of shareholder wealth creation following hedge fund activists' interventions. We challenge the results

documented in a number of recent papers that investigate the effect of hedge fund activists on company performance. Brav et al. (2008), Klein and Zur (2009), Bessler et al. (2015), Becht et al. (2015), and Bebchuk et al. (2015) show that both short and long term shareholder wealth increases following hedge fund activists' engagements. The logical conjecture of these results is that hedge fund activists possess the ability and expertise to identify the necessary changes that would enhance company performance and to induce company management to implement these changes. However, the choice of hedge fund targets is an endogenous decision. It is therefore unclear whether the hedge fund activists contribute to value generation or whether they have the ability to select those companies which are more likely to experience performance improvements that are independent from the hedge fund's intervention. In order to treat the problem of endogeneity we evaluate performance improvements relative to the improvements experienced by a group of control companies which were not targeted by activists but otherwise resemble target firms. We identify the group of control firms by on the basis of a set of characteristics that can predict the likelihood of being targeted by a hedge fund activist. These characteristics capture company size, operational performance, degree of indebtedness, free cash flow problems and perceived undervaluation. Our results confirm that companies have an enhanced ability to generate value following interventions by hedge fund activists during the two-year period post intervention. However, we also demonstrate the observed improvements in performance are not caused by the hedge fund activists' involvements. Instead, it is the very characteristic that distinguish between hedge fund targets and non-targets that are also associated with the observed improvements in company performance. Our results also reveal that the hedge fund targets may have experienced even more pronounced performance improvements were it not for the hedge funds' interventions. These results point to the fact that hedge fund activists may have an adverse effect on companies' ability to generate long-term wealth for shareholders.

Our analysis carries important implications for a number of ongoing policy debates. Specifically, our findings are relevant to policy discussions around determining a) shareholders' influence vis-à-vis boards of directors, b) shareholders' power to replace directors, c) the rights of short-term investors, d) the disclosure requirements associated with stock acquisitions by hedge fund activists,

and e) the degree to which board of directors should accommodate the preferences of activists. Institutional investors and policymakers should consider the fact that activist interventions could be detrimental to shareholder wealth when defining the 'rules of engagement' between companies and hedge fund activists.

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Table 1. Sample distribution per year, country, region and industry

Panel A: Activist engagements by year

Year of engagement announcement	Number of engagements	Percent
2000	25	1.4%
2001	33	1.9%
2002	44	2.5%
2003	35	2.0%
2004	42	2.4%
2005	54	3.1%
2006	75	4.3%
2007	96	5.5%
2008	121	6.9%
2009	118	6.7%
2010	135	7.7%
2011	255	14.6%
2012	309	17.7%
2013	216	12.3%
2014	192	11.0%
Total	1,750	100%

Panel B: Activist engagements by country

Country	Number of engagements	Percent
United States	1465	83.7%
United Kingdom	94	5.4%
Canada	81	4.6%
Germany	27	1.5%
France	18	1.0%
Japan	9	0.5%
Netherlands	9	0.5%
Australia	5	0.3%
Israel	5	0.3%
Sweden	5	0.3%
Switzerland	4	0.2%
Denmark	3	0.2%
Finland	3	0.2%
Norway	3	0.2%
Hong Kong	2	0.1%
Ireland	2	0.1%
Malaysia	2	0.1%
South Korea	2	0.1%
Spain	2	0.1%
Bangladesh	1	0.1%
Belgium	1	0.1%
Brazil	1	0.1%
Croatia	1	0.1%
Cyprus	1	0.1%
India	1	0.1%
Poland	1	0.1%
Singapore	1	0.1%
Thailand	1	0.1%
Total	1,750	100%

Panel C: Activist engagements by region

Region of activist target	Number of engagements	Percent
North America	1,546	88.3%
Europe	174	9.9%
Asia-Pacific	29	1.7%
Latin America	1	0.1%
Total	1,750	100%

Panel D: Activist engagements by industry

Industry of activist target	Number of engagements	Percent
Financials	355	20.3%
Technology	299	17.1%
Consumer Services	267	15.3%
Industrials	252	14.4%
Health Care	200	11.4%
Consumer Goods	128	7.3%
Basic Materials	99	5.7%
Oil & Gas	94	5.4%
Telecommunications	37	2.1%
Utilities	19	1.1%
Total	1,750	100%

Notes: The sample covers the period 1990 - 2014. The sample of hedge fund involvements is obtained from the Thomson One Banker database.

Table 2. Sample distribution per outcome and type

Panel A: Activist engagements by outcome

Engagement outcome	Number of engagements	Percent
Completed	1,447	82.7%
Hedge Fund Victory	863	49.3%
Management Victory	584	33.4%
Outcome Pending	303	17.3%
Total	1,750	100%

Panel B: Activist engagements by type

Engagement type	Number of engagements	Percent
Governance	757	87.7%
Strategic Direction	217	25.1%
Restructuring	127	14.7%
Other	15	1.7%
Total	863	-

Notes: The sample covers the period 1990 - 2014. The sample of hedge fund involvements is obtained from the Thomson One Banker database.

Table 3. Sample descriptive statistics

Panel A: Unadjusted values

Variable	Activist targets (A)		Controls (B)		Mean comparison test (B) – (A)	Median comparison test (B) – (A)
	Mean	Median	Mean	Median		
Total return (3-year)	0.017	-0.011	0.122	0.062	**0.105***** (10.372)	**0.073***** (11.250)
Net debt to market cap	0.508	0.039	0.494	0.095	-0.014 (-0.3957)	**0.056***** (5.849)
Return on capital employed	-0.027	0.031	0.053	0.059	**0.080***** (19.016)	**0.028***** (15.904)
Undervaluation	-0.224	-0.185	-0.144	-0.123	**0.080***** (11.665)	**0.062***** (11.244)
Forward P/E ratio	12.729	12.473	16.416	13.976	**3.687***** (6.549)	**1.503***** (7.295)
Earnings surprise	-0.462	-0.603	-0.212	-0.192	**0.250***** (13.300)	**0.411***** (16.550)
Sales growth (3-year)	0.095	0.037	0.142	0.085	**0.047***** (5.543)	**0.048***** (10.558)
Capex to sales	0.104	0.029	0.110	0.038	0.006 1.016	**0.009***** (6.269)
Dividend yield	1.034	0.000	1.759	1.130	**0.725***** (13.608)	**1.130***** (22.552)
Price to free cash flow	7.636	6.771	8.486	8.047	0.850 (0.330)	**1.276*** (1.773)
Market to book	2.031	1.350	2.261	1.430	**0.230***** (3.403)	**0.080***** (3.674)
Cash to total assets	0.225	0.139	0.173	0.117	**-0.052***** (-11.241)	**-0.023***** (-5.538)

Panel B: Industry-adjusted values

Variable	Activist targets (A)		Controls (B)		Mean comparison test (B) – (A)	Median comparison test (B) – (A)
	Mean	Median	Mean	Median		
Total return (3-year)	-0.097	-0.123	0.000	-0.032	**0.097*** ** (8.9143)	**0.091*** ** (9.430)
Net debt to market cap	0.060	-0.251	-0.047	-0.292	**-0.107*** ** (-3.0191)	**-0.041** ** (-2.516)
Return on capital employed	-0.077	-0.023	0.002	0.005	**0.078*** ** (18.6868)	**0.027*** ** (15.410)
Undervaluation	-0.073	-0.048	0.007	0.015	**0.080*** ** (11.1485)	**0.063*** ** (10.681)
Forward P/E ratio	-3.372	-3.400	-0.317	-1.988	**3.056*** ** (5.6834)	**1.411*** ** (6.213)
Earnings surprise	-0.240	-0.371	-0.005	-0.012	**0.235*** ** (12.3853)	**0.359*** ** (15.562)
Sales growth (3-year)	-0.050	-0.107	-0.007	-0.062	**0.043*** ** (5.0098)	**0.045*** ** (9.510)
Capex to sales	-0.006	-0.049	-0.001	-0.046	0.005 (0.7927)	0.003*** (2.952)
Dividend yield	-0.663	-1.137	-0.003	-0.577	**0.660*** ** (12.417)	**0.559*** ** (17.035)
Price to free cash flow	-0.394	-0.750	-0.063	-0.119	0.331 (0.131)	0.631 (0.997)
Market to book	-0.361	-0.766	-0.050	-0.649	**0.312*** ** (4.696)	**0.117*** ** (5.178)
Cash to total assets	0.027	-0.050	0.001	-0.045	**-0.026*** ** (-6.010)	0.005 (0.285)

Notes: The sample covers the period 1990 - 2014. *** indicates significance at the 1% level, ** indicates significance at the 5% level, and * indicates significance at the 10% level.

Table 4. Analysis of likelihood of becoming the target of an activist engagement. Model 1 reports the results from the analysis with industry adjusted company financial characteristics and Model 2 reports the results from the analysis with unadjusted company financial characteristics

Variable Name	**Model 1 Unadjusted metrics**	**Model 1 Marginal Probabilities**	**Model 2 Industry adjusted metrics**	**Model 2 Marginal Probabilities**
Total return (3-year)	**-0.184***** (-3.298)	-1.16%	**-0.154***** (-2.872)	-0.98%
Net debt to market cap	**-0.0662***** (-2.798)	-0.42%	**-0.0409**** (-2.190)	-0.26%
Return on capital employed	-0.164 (-1.292)	-1.03%	**-0.290**** (-2.440)	-1.84%
Undervaluation	**-0.229***** (-2.718)	-1.44%	**-0.363***** (-4.610)	-2.31%
Forward P/E ratio	**-0.00210**** (-2.242)	-0.01%	**-0.00178*** (-1.811)	-0.01%
Earnings surprise	**-0.126***** (-2.890)	-0.79%	**-0.110***** (-2.605)	-0.70%
Sales growth (3-year)	**-0.176***** (-2.777)	-1.11%	**-0.158**** (-2.542)	-1.01%
Capex to sales	-0.154 (-1.633)	-0.97%	-0.134 (-1.513)	-0.85%
Dividend yield	**-0.112***** (-7.665)	-0.71%	**-0.0991***** (-8.047)	-0.63%
Price to free cash flow	0.000257 (1.603)	0.002%	**0.000293*** (1.793)	0.00%
Market to book	**-0.0146*** (-1.688)	-0.09%	-0.0102 (-1.245)	-0.06%
Cash to total assets	0.0366 (0.309)	0.23%	-0.0612 (-0.507)	-0.39%
Market cap.	**-0.0763***** (-6.191)	-0.48%	**-0.0836***** (-6.948)	-0.53%
R&D to sales	0.00761 (0.0658)	0.05%	-0.000665 (-0.138)	-0.004%
Closely Held Shares	**-0.983***** (-9.260)	-6.19%	**-1.016***** (-9.526)	-6.46%
Share turnover	**0.0391***** (5.109)	0.25%	**0.0435***** (5.811)	0.28%
Constant	**-1.004***** (-9.513)	-	**-1.206***** (-12.96)	-
Activist Engagements	1,750		1,750	
Pseudo R^2	0.095		0.092	

Notes: The sample covers the period 2000 - 2014. *** indicates significance at the 1% level, ** indicates significance at the 5% level, and * indicates significance at the 10% level. The likelihood models use probit regression specification. We include year, industry and country fixed effects in each regression model.

Table 5. Analysis of cumulative abnormal returns (CAR) around the announcement of activist engagements: breakdown per engagement outcome.

Panel A: CAR adjusted to local index

Average	**All Announced**	**Completed**	**HF Victory**	**Management Victory**
CAR $_{t\text{-}1d \text{ to } t+1d}$	**0.032*****	**0.034*****	**0.033*****	**0.034****
	4.991	5.036	13.615	2.056
CAR $_{t\text{-}2d \text{ to } t+2d}$	**0.064*****	**0.060*****	**0.062*****	**0.057*****
	7.708	6.946	19.393	2.693
CAR $_{t\text{-}10d \text{ to } t+10d}$	**0.059*****	**0.060*****	**0.062*****	0.058
	3.496	3.413	9.453	1.341
CAR $_{t\text{-}20d \text{ to } t+20d}$	**0.076*****	**0.073*****	**0.077*****	0.065
	3.211	2.944	8.487	1.080
Number of observations	1,750	1,447	863	584

Panel B: CAR adjusted to industry index

Average	**All Announced**	**Completed**	**HF Victory**	**Management Victory**
CAR $_{t\text{-}1d \text{ to } t+1d}$	**0.032*****	**0.034*****	**0.034*****	**0.034****
	5.033	5.102	13.603	2.077
CAR $_{t\text{-}2d \text{ to } t+2d}$	**0.067*****	**0.063*****	**0.065*****	**0.061*****
	8.143	7.359	20.174	2.866
CAR $_{t\text{-}10d \text{ to } t+10d}$	**0.080*****	**0.062*****	**0.064*****	0.060
	3.358	3.546	9.730	1.379
CAR $_{t\text{-}20d \text{ to } t+20d}$	**0.061*****	**0.076*****	**0.080*****	0.070
	3.599	3.100	8.725	1.155
Number of observations	1,750	1,447	863	584

Notes: The sample covers the period 1990 - 2014. *** indicates significance at the 1% level, ** indicates significance at the 5% level, and * indicates significance at the 10% level.

Table 6. Analysis of cumulative abnormal returns (CAR) around the announcement of activist engagements: breakdown per engagement type.

Panel A: CAR adjusted to local index

Average	**Strategic Direction**	**Governance**	**Restructuring**	**Other**
CAR $_{t\text{-}1d \text{ to } t+1d}$	**0.042*****	**0.024*****	**0.109*****	**0.036*****
	7.346	8.494	13.999	4.299
CAR $_{t\text{-}2d \text{ to } t+2d}$	**0.036*****	**0.055*****	**0.180*****	**0.050*****
	4.844	14.925	17.965	4.600
CAR $_{t\text{-}10d \text{ to } t+10d}$	**0.074*****	**0.051*****	**0.156*****	**0.041***
	4.830	6.757	7.590	1.832
CAR $_{t\text{-}20d \text{ to } t+20d}$	**0.068*****	**0.070*****	**0.172*****	**0.059***
	3.186	6.677	6.014	1.888
Number of observations	217	757	127	15

Panel A: CAR adjusted to industry index

Average	**Strategic Direction**	**Governance**	**Restructuring**	**Other**
CAR $_{t\text{-}1d \text{ to } t+1d}$	**0.044*****	**0.024*****	**0.106*****	**0.039*****
	7.429	8.503	13.403	4.551
CAR $_{t\text{-}2d \text{ to } t+2d}$	**0.044*****	**0.058*****	**0.170*****	**0.052*****
	5.821	15.720	16.646	4.680
CAR $_{t\text{-}10d \text{ to } t+10d}$	**0.079*****	**0.053*****	**0.157*****	**0.044***
	5.069	6.948	7.476	1.955
CAR $_{t\text{-}20d \text{ to } t+20d}$	**0.076*****	**0.073*****	**0.168*****	**0.072****
	3.464	6.830	5.728	2.271
Number of observations	217	757	127	15

Notes: The sample covers the period 1990 - 2014. *** indicates significance at the 1% level, ** indicates significance at the 5% level, and * indicates significance at the 10% level.

Table 7. Analysis of buy-and-hold abnormal returns (BHAR) following activist engagements: breakdown per engagement outcome.

Panel A: BHAR adjusted to local index

Engagement Outcome	**All Announced**	**Completed**	**HF Victory**	**Management Victory**
Average (no adjustment for control firm BHAR)				
$BHAR_{t-60m\ to\ t-1m}$	0.011	0.038	-0.007	**0.111***
	0.044	0.047	0.056	0.083
$BHAR_{t-48m\ to\ t-1m}$	-0.019	-0.009	-0.002	-0.022
	0.037	0.039	0.049	0.065
$BHAR_{t-36m\ to\ t-1m}$	**-0.080*** **	**-0.080*** **	**-0.069** **	**-0.100** **
	0.028	0.029	0.038	0.048
$BHAR_{t-24m\ to\ t-1m}$	**-0.118*** **	**-0.109*** **	**-0.107*** **	**-0.113*** **
	0.021	0.022	0.028	0.036
$BHAR_{t-12m\ to\ t-1m}$	**-0.096*** **	**-0.090*** **	**-0.099*** **	**-0.077*** **
	0.014	0.014	0.018	0.025
$BHAR_{t-1m\ to\ t+12m}$	0.011	0.016	0.015	0.018
	0.015	0.016	0.019	0.027
$BHAR_{t-1m\ to\ t+24m}$	**0.031***	**0.046** **	**0.041***	**0.057***
	0.024	0.025	0.031	0.042
$BHAR_{t-1m\ to\ t+36m}$	0.025	0.034	0.051	0.014
	0.036	0.036	0.048	0.055
$BHAR_{t-1m\ to\ t+48m}$	0.014	0.014	0.012	0.019
	0.044	0.044	0.056	0.071
$BHAR_{t-1m\ to\ t+60m}$	-0.027	-0.027	0.035	-0.106
	0.061	0.061	0.080	0.094
Average Treatment Effects (adjusted for matched control firm BHAR)				
Diff. in Diff. Treatment Effects $BHAR_{t-1m\ to\ t+12m}$	**-0.094*** **	**-0.086*** **	**-0.113*** **	-0.043
	0.024	0.025	0.031	0.041
Diff. in Diff. Treatment Effects $BHAR_{t-1m\ to\ t+24m}$	**-0.166*** **	**-0.150*** **	**-0.221*** **	**-0.125***
	0.039	0.041	0.081	0.066
Diff. in Diff. Treatment Effects $BHAR_{t-1m\ to\ t+36m}$	**-0.224*** **	**-0.226*** **	**-0.166*** **	**-0.233*** **
	0.058	0.059	0.051	0.083
Diff. in Diff. Treatment Effects $BHAR_{t-1m\ to\ t+48m}$	**-0.309*** **	**-0.309*** **	**-0.315*** **	**-0.302*** **
	0.069	0.069	0.094	0.099
Diff. in Diff. Treatment Effects $BHAR_{t-1m\ to\ t+60m}$	**-0.383*** **	**-0.383*** **	**-0.304** **	**-0.487*** **
	0.095	0.095	0.127	0.139
Number of observations	1,342	1,215	698	517

Panel B: BHAR adjusted to industry

Engagement Outcome	All Announced	Completed	HF Victory	Management Victory
Average (no adjustment for control firm BHAR)				
$BHAR_{t-60m\ to\ t-1m}$	-0.039	-0.018	**-0.085***	0.093
	0.046	0.049	0.058	0.088
$BHAR_{t-48m\ to\ t-1m}$	**-0.075****	**-0.071****	**-0.082***	**-0.051**
	0.038	0.040	0.050	0.067
$BHAR_{t-36m\ to\ t-1m}$	**-0.117*****	**-0.123*****	**-0.120*****	**-0.125*****
	0.029	0.030	0.038	0.050
$BHAR_{t-24m\ to\ t-1m}$	**-0.145*****	**-0.145*****	**-0.146*****	**-0.141*****
	0.022	0.023	0.029	0.037
$BHAR_{t-12m\ to\ t-1m}$	**-0.104*****	**-0.103*****	**-0.114*****	**-0.085*****
	0.014	0.015	0.018	0.025
$BHAR_{t-1m\ to\ t+12m}$	0.014	0.021	0.030	0.007
	0.020	0.021	0.027	0.032
$BHAR_{t-1m\ to\ t+24m}$	0.032	**0.050***	**0.059***	0.034
	0.031	0.033	0.045	0.048
$BHAR_{t-1m\ to\ t+36m}$	0.014	0.024	0.055	-0.017
	0.046	0.047	0.065	0.066
$BHAR_{t-1m\ to\ t+48m}$	-0.013	-0.037	-0.017	-0.060
	0.046	0.041	0.054	0.065
$BHAR_{t-1m\ to\ t+60m}$	-0.074	**-0.115****	-0.052	**-0.198****
	0.065	0.056	0.075	0.084
Average Treatment Effects (adjusted for matched control firm BHAR)				
Diff. in Diff. Treatment Effects $BHAR_{t-1m\ to\ t+12m}$	**-0.058****	**-0.063****	-0.043	**-0.096***
	0.029	0.030	0.037	0.050
Diff. in Diff. Treatment Effects $BHAR_{t-1m\ to\ t+24m}$	**-0.089***	**-0.086***	-0.059	-0.130
	0.048	0.050	0.064	0.080
Diff. in Diff. Treatment Effects $BHAR_{t-1m\ to\ t+36m}$	**-0.178****	**-0.163****	-0.099	**-0.247****
	0.076	0.076	0.097	0.120
Diff. in Diff. Treatment Effects $BHAR_{t-1m\ to\ t+48m}$	**-0.151****	**-0.144****	-0.123	**-0.171***
	0.071	0.063	0.081	0.097
Diff. in Diff. Treatment Effects $BHAR_{t-1m\ to\ t+60m}$	**-0.261****	**-0.244*****	-0.162	**-0.355*****
	0.101	0.087	0.117	0.124
Number of observations	1,342	1,215	698	517

Notes: The sample covers the period 1990 - 2014. *** indicates significance at the 1% level, ** indicates significance at the 5% level, and * indicates significance at the 10% level.

Table 8. Analysis of buy-and-hold abnormal returns (BHAR) following activist engagements: breakdown per engagement type.

Panel A: BHAR adjusted to local index

Engagement Type	**Strategic Direction**	**Governance**	**Restructuring**	**Other**
Average (no adjustment for control firm BHAR)				
$BHAR_{t\text{-}60m \text{ to } t\text{-}1m}$	0.053	**-0.079***	0.097	**0.168****
	0.193	0.057	0.208	0.085
$BHAR_{t\text{-}48m \text{ to } t\text{-}1m}$	-0.136	-0.010	0.014	0.009
	0.087	0.057	0.195	0.063
$BHAR_{t\text{-}36m \text{ to } t\text{-}1m}$	0.009	**-0.082****	-0.072	**-0.089****
	0.124	0.043	0.130	0.046
$BHAR_{t\text{-}24m \text{ to } t\text{-}1m}$	**-0.138****	**-0.130****	0.041	**-0.098*****
	0.065	0.031	0.120	0.035
$BHAR_{t\text{-}12m \text{ to } t\text{-}1m}$	**-0.113****	**-0.108*****	-0.074	**-0.067*****
	0.050	0.020	0.067	0.024
$BHAR_{t\text{-}1m \text{ to } t+12m}$	-0.016	**0.033***	**-0.076***	0.014
	0.058	0.022	0.054	0.026
$BHAR_{t\text{-}1m \text{ to } t+24m}$	-0.123	**0.091*****	**-0.125***	0.042
	0.089	0.037	0.086	0.040
$BHAR_{t\text{-}1m \text{ to } t+36m}$	-0.197	**0.099****	**-0.146***	-0.001
	0.237	0.054	0.098	0.052
$BHAR_{t\text{-}1m \text{ to } t+48m}$	-0.177	0.050	**-0.308*****	-0.014
	0.273	0.059	0.113	0.061
$BHAR_{t\text{-}1m \text{ to } t+60m}$	0.418	0.026	**-0.035****	**-0.141****
	0.660	0.075	0.014	0.078
Average Treatment Effects (adjusted for matched control firm BHAR)				
Diff. in Diff. Treatment Effects $BHAR_{t\text{-}1m \text{ to } t+12m}$	-0.115	**-0.096*****	-0.154	-0.061
	0.094	0.035	0.106	0.039
Diff. in Diff. Treatment Effects $BHAR_{t\text{-}1m \text{ to } t+24m}$	**-0.282****	**-0.106***	**-0.380****	**-0.152****
	0.127	0.060	0.166	0.064
Diff. in Diff. Treatment Effects $BHAR_{t\text{-}1m \text{ to } t+36m}$	-0.173	**-0.192****	-0.288	**-0.261*****
	0.287	0.092	0.176	0.081
Diff. in Diff. Treatment Effects $BHAR_{t\text{-}1m \text{ to } t+48m}$	-0.135	**-0.233****	**-0.679*****	**-0.305*****
	0.330	0.094	0.244	0.088
Diff. in Diff. Treatment Effects $BHAR_{t\text{-}1m \text{ to } t+60m}$	0.458	**-0.237****	**-0.118*****	**-0.465*****
	0.706	0.116	0.044	0.120
Number of observations	217	757	127	15

Panel B: BHAR adjusted to industry

Engagement Type	Strategic Direction	Governance	Restructuring	Other
Average (no adjustment for control firm BHAR)				
BHAR $_{t\text{-}60m \text{ to } t\text{-}1m}$	0.041	**-0.169*** **	-0.063	**0.161** **
	0.203	0.058	0.185	0.091
BHAR $_{t\text{-}48m \text{ to } t\text{-}1m}$	**-0.168***	**-0.098** **	-0.096	-0.019
	0.1003	0.058	0.179	0.065
BHAR $_{t\text{-}36m \text{ to } t\text{-}1m}$	-0.007	**-0.138*** **	-0.151	**-0.114*** **
	0.133	0.043	0.131	0.048
BHAR $_{t\text{-}24m \text{ to } t\text{-}1m}$	**-0.153** **	**-0.168*** **	-0.042	**-0.128*** **
	0.066	0.033	0.121	0.036
BHAR $_{t\text{-}12m \text{ to } t\text{-}1m}$	**-0.101** **	**-0.126*** **	**-0.095***	**-0.076*** **
	0.056	0.020	0.064	0.025
BHAR $_{t\text{-}1m \text{ to } t+12m}$	-0.005	**0.054***	**-0.104** **	0.004
	0.069	0.033	0.060	0.030
BHAR $_{t\text{-}1m \text{ to } t+24m}$	-0.108	**0.119** **	**-0.141***	0.017
	0.103	0.054	0.097	0.046
BHAR $_{t\text{-}1m \text{ to } t+36m}$	-0.237	**0.111***	**-0.173***	-0.032
	0.249	0.075	0.111	0.062
BHAR $_{t\text{-}1m \text{ to } t+48m}$	-0.142	0.022	**-0.280** **	-0.069
	0.272	0.060	0.121	0.062
BHAR $_{t\text{-}1m \text{ to } t+60m}$	0.362	-0.035	-0.309	**-0.212*** **
	0.671	0.079	0.235	0.081
Average Treatment Effects (adjusted for matched control firm BHAR)				
Diff. in Diff. Treatment Effects BHAR $_{t\text{-}1m \text{ to } t+12m}$	-0.084	-0.029	**-0.152***	**-0.089***
	0.120	0.044	0.088	0.048
Diff. in Diff. Treatment Effects BHAR $_{t\text{-}1m \text{ to } t+24m}$	-0.174	-0.025	-0.151	**-0.136***
	0.160	0.078	0.140	0.075
Diff. in Diff. Treatment Effects BHAR $_{t\text{-}1m \text{ to } t+36m}$	-0.246	-0.068	-0.161	**-0.254** **
	0.313	0.112	0.311	0.114
Diff. in Diff. Treatment Effects BHAR $_{t\text{-}1m \text{ to } t+48m}$	**-0.509***	-0.086	-0.200	**-0.174***
	0.291	0.092	0.266	0.092
Diff. in Diff. Treatment Effects BHAR $_{t\text{-}1m \text{ to } t+60m}$	-0.072	-0.158	-0.020	**-0.362*** **
	0.791	0.125	0.475	0.119
Number of observations	217	757	127	15

Notes: The sample covers the period 1990 - 2014. *** indicates significance at the 1% level, ** indicates significance at the 5% level, and * indicates significance at the 10% level.

Table 9. Analysis of return on equity (ROE) following activist engagements: breakdown per engagement outcome.

Panel A: ROE adjusted to local index

Engagement Outcome	**All Announced**	**Completed**	**HF Victory**	**Management Victory**
Average (no adjustment for control firm ROE)				
ROE $_{t-5y}$	**-0.017***	**-0.022***	-0.011	**-0.030***
	0.013	0.015	0.023	0.020
ROE $_{t-4y}$	**-0.041*****	**-0.034*****	-0.013	**-0.048*****
	0.012	0.014	0.020	0.019
ROE $_{t-3y}$	**-0.045*****	**-0.045*****	**-0.053*****	**-0.039****
	0.012	0.013	0.019	0.019
ROE $_{t-2y}$	**-0.053*****	**-0.052*****	**-0.038****	**-0.061*****
	0.011	0.012	0.017	0.018
ROE $_{t-1y}$	**-0.093*****	**-0.080*****	**-0.089*****	**-0.073*****
	0.010	0.012	0.016	0.017
ROE $_{t+1y}$	**-0.127*****	**-0.122*****	**-0.136*****	**-0.112*****
	0.011	0.012	0.018	0.016
ROE $_{t+2y}$	**-0.105*****	**-0.099*****	**-0.105*****	**-0.096*****
	0.012	0.014	0.027	0.016
ROE $_{t+3y}$	**-0.109*****	**-0.105*****	**-0.110*****	**-0.103*****
	0.016	0.017	0.038	0.020
ROE $_{t+4y}$	**-0.081*****	**-0.071*****	**-0.078*****	**-0.069*****
	0.016	0.017	0.030	0.021
ROE $_{t+5y}$	**-0.096*****	**-0.089*****	**-0.063****	**-0.098*****
	0.015	0.016	0.033	0.019
Average Treatment Effects (adjusted for matched control firm ROE)				
Treatment Effects ROE $_{t+1y}$	**-0.072*****	**-0.069*****	**-0.076****	**-0.065****
	0.023	0.026	0.030	0.033
Treatment Effects ROE $_{t+2y}$	**-0.089*****	**-0.090*****	**-0.074****	**-0.085****
	0.027	0.029	0.034	0.036
Treatment Effects ROE $_{t+3y}$	**-0.043***	-0.034	-0.005	-0.046
	0.024	0.026	0.074	0.030
Treatment Effects ROE $_{t+4y}$	-0.026	-0.004	**0.075***	-0.045
	0.026	0.027	0.043	0.042
Treatment Effects ROE $_{t+5y}$	-0.007	-0.0004	0.006	-0.0004
	0.033	0.026	0.080	0.041
Number of observations	1,342	1,215	698	517

Panel B: ROE adjusted to industry

Engagement Outcome	All Announced	Completed	HF Victory	Management Victory
Average (no adjustment for control firm ROE)				
ROE $_{t-5y}$	-0.005	-0.007	0.034	**-0.038****
	0.017	0.019	0.030	0.026
ROE $_{t-4y}$	**-0.029****	**-0.024***	-0.005	**-0.038****
	0.016	0.018	0.029	0.022
ROE $_{t-3y}$	**-0.065*****	**-0.073*****	**-0.093*****	**-0.059*****
	0.016	0.018	0.027	0.024
ROE $_{t-2y}$	**-0.045*****	**-0.041*****	**-0.047****	**-0.037***
	0.014	**0.016**	**0.024**	**0.023**
ROE $_{t-1y}$	**-0.090*****	**-0.087*****	**-0.089*****	**-0.086*****
	0.014	0.016	0.024	0.022
ROE $_{t+1y}$	**-0.115*****	**-0.117*****	**-0.136*****	**-0.105*****
	0.012	0.019	0.028	0.025
ROE $_{t+2y}$	**-0.135*****	**-0.133*****	**-0.147*****	**-0.126*****
	0.019	0.021	0.040	0.025
ROE $_{t+3y}$	**-0.128*****	**-0.123*****	**-0.151*****	**-0.113*****
	0.023	0.026	0.057	0.029
ROE $_{t+4y}$	**-0.092*****	**-0.075*****	**-0.083****	**-0.072*****
	0.023	0.023	0.036	0.029
ROE $_{t+5y}$	**-0.110*****	**-0.101*****	**-0.079****	**-0.109*****
	0.022	0.023	0.035	0.029
Average Treatment Effects (adjusted for matched control firm ROE)				
Treatment Effects ROE $_{t+1y}$	**-0.072*****	**-0.069*****	**-0.076****	**-0.065****
	0.023	0.026	0.030	0.033
Treatment Effects ROE $_{t+2y}$	**-0.089*****	**-0.090*****	**-0.074****	**-0.085****
	0.027	0.029	0.034	0.036
Treatment Effects ROE $_{t+3y}$	**-0.043***	-0.034	0.001	-0.046
	0.024	0.026	0.049	0.030
Treatment Effects ROE $_{t+4y}$	-0.026	-0.004	0.049	-0.045
	0.026	0.027	0.032	0.042
Treatment Effects ROE $_{t+5y}$	-0.007	-0.0003	0.006	-0.0004
	0.033	0.026	0.080	0.041
Number of observations	1,342	1,215	698	517

Notes: The sample covers the period 1990 - 2014. *** indicates significance at the 1% level, ** indicates significance at the 5% level, and * indicates significance at the 10% level.

Table 10. Analysis of return on equity (ROE) following activist engagements: breakdown per engagement type.

Panel A: ROE adjusted to local index

Engagement Type	**Strategic Direction**	**Governance**	**Restructuring**	**Other**
Average (no adjustment for control firm ROE)				
ROE $_{t-5y}$	0.003	**-0.043****	**-0.069***	**-0.249****
	0.035	0.019	0.050	0.126
ROE $_{t-4y}$	**-0.101*****	**-0.059*****	**-0.090****	0.043
	0.031	0.018	0.044	0.089
ROE $_{t-3y}$	**-0.110*****	**-0.078*****	**-0.092****	-0.079
	0.035	0.019	0.040	0.089
ROE $_{t-2y}$	**-0.071*****	**-0.072*****	**-0.085****	**-0.107***
	0.028	0.017	0.039	0.078
ROE $_{t-1y}$	**-0.145*****	**-0.120*****	**-0.105*****	-0.076
	0.024	0.016	0.036	0.065
ROE $_{t+1y}$	**-0.124*****	**-0.129*****	**-0.148*****	**-0.107****
	0.020	0.012	0.026	0.065
ROE $_{t+2y}$	**-0.115*****	**-0.100*****	**-0.123*****	**-0.125****
	0.024	0.013	0.033	0.048
ROE $_{t+3y}$	**-0.151*****	**-0.111*****	**-0.117*****	-0.071
	0.037	0.017	0.043	0.100
ROE $_{t+4y}$	**-0.087****	**-0.078*****	-0.038	-0.068
	0.042	0.017	0.044	0.096
ROE $_{t+5y}$	**-0.111*****	**-0.095*****	**-0.120*****	0.006
	0.029	0.016	0.040	0.046
Average Treatment Effects (adjusted for matched control firm ROE)				
Treatment Effects ROE $_{t+1y}$	**-0.099****	**-0.066****	**-0.116***	-0.039
	0.045	0.025	0.062	0.079
Treatment Effects ROE $_{t+2y}$	**-0.130*****	**-0.063*****	**-0.130*****	**-0.139****
	0.050	0.020	0.049	0.065
Treatment Effects ROE $_{t+3y}$	-0.080	-0.037	**-0.133****	0.056
	0.054	0.025	0.064	0.112
Treatment Effects ROE $_{t+4y}$	-0.105	-0.020	-0.081	**-0.177***
	0.080	0.027	0.063	0.106
Treatment Effects ROE $_{t+5y}$	0.004	-0.005	-0.046	0.085
	0.062	0.025	0.043	0.065
Number of observations	217	757	127	15

Panel B: ROE adjusted to industry

Engagement Type	Strategic Direction	Governance	Restructuring	Other
Average (no adjustment for control firm ROE)				
ROE $_{t-5y}$	0.013	-0.004	-0.029	-0.137
	0.035	0.019	0.045	0.106
ROE $_{t-4y}$	**-0.051***	**-0.023***	**-0.062***	0.055
	0.032	0.017	0.044	0.087
ROE $_{t-3y}$	**-0.089*****	**-0.063*****	-0.043	-0.066
	0.033	0.017	0.037	0.078
ROE $_{t-2y}$	**-0.062*****	**-0.030****	**-0.064****	-0.061
	0.025	0.016	0.034	0.072
ROE $_{t-1y}$	**-0.113*****	**-0.086****	**-0.051***	-0.011
	0.026	0.016	0.034	0.051
ROE $_{t+1y}$	**-0.138*****	**-0.133*****	**-0.144*****	**-0.115***
	0.030	0.018	0.041	0.070
ROE $_{t+2y}$	**-0.156*****	**-0.129*****	**-0.127*****	**-0.149****
	0.033	0.021	0.052	0.080
ROE $_{t+3y}$	**-0.148*****	**-0.134*****	**-0.096****	-0.069
	0.037	0.025	0.050	0.126
ROE $_{t+4y}$	**-0.082***	**-0.094*****	-0.048	-0.064
	0.057	0.025	0.062	0.098
ROE $_{t+5y}$	**-0.152*****	**-0.112*****	**-0.092*****	-0.029
	0.032	0.024	0.034	0.065
Average Treatment Effects (adjusted for matched control firm ROE)				
Treatment Effects ROE $_{t+1y}$	**-0.111****	**-0.055****	**-0.087****	-0.100
	0.046	0.026	0.041	0.089
Treatment Effects ROE $_{t+2y}$	**-0.147*****	**-0.111*****	**-0.165*****	**-0.096***
	0.051	0.028	0.052	0.055
Treatment Effects ROE $_{t+3y}$	-0.040	**-0.065***	-0.098	-0.038
	0.055	0.036	0.087	0.128
Treatment Effects ROE $_{t+4y}$	-0.038	**-0.070***	-0.077	-0.087
	0.064	0.036	0.059	0.097
Treatment Effects ROE $_{t+5y}$	-0.064	-0.066	**-0.121***	0.002
	0.107	0.043	0.070	0.053
Number of observations	217	757	127	15

Notes: The sample covers the period 1990 - 2014. *** indicates significance at the 1% level, ** indicates significance at the 5% level, and * indicates significance at the 10% level.