

Hedge Fund Win versus Management Win: Activism Outcome, Governance Impact and Shareholder Value Gains

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Abstract

Using an international sample of 1,750 hedge fund activist engagements from 2000 to 2014, we examine whether these engagements cause improvements in long-term firm performance and shareholder value. Endogeneity is a critical issue in this context since factors that make companies attractive targets for activism may also be the primary drivers of any performance improvement. Once endogeneity is accounted for, we find no evidence to support the view that hedge fund activism leads to long-term shareholder wealth creation. In fact, companies targeted by hedge funds might have experienced even better performance were it not for the activists' engagements. Further analysis suggests that target firms underperform significantly more when the hedge funds fail in their campaign and incumbent managers prevail. In these cases, the target shareholders experience significantly higher agency costs associated with managerial entrenchment but these costs are alleviated to some extent by increased board independence or CEO. Overall, while HF activism is not great news for target shareholders, what is worse news is that incumbent managers defeat the HF campaign.

JEL classification: G32; G38

Keywords: Hedge fund activism, management entrenchment, endogeneity and long term shareholder value

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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 leading to shareholder value gains. 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 engagement 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 again adjusted for industry, size and market factors. These types of benchmarks are inappropriate since they do not reliably capture the counterfactual case i.e. what the target firms’ performance would have been in the absence of HF engagement. These prior studies do not account for the self-selection bias which arises from the fact that hedge funds may select as targets those firms that are most likely to respond to their campaign and thereby generate value or for the endogeneity of the factors that influence the choice of targets as well as the performance outcomes of that choice. The resulting value gains may not have been due to the hedge fund intervention at all but due to the inherent characteristics of the targets selected by these hedge funds. Since prior studies do not distinguish the value outcomes due to HF intervention from the value outcomes that might have been achieved in the counter-factual case, the value gains they report cannot be unambiguously and causally attributed to hedge fund activism alone. It is therefore necessary to adopt a more robust methodology to correct for the presence of self-selection/endogeneity bias since hedge fund targets are not randomly selected. 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 selection for hedge fund activism is endogenous, i.e. contingent upon a group of observable company characteristics, the treatment effect can be evaluated by building a control sample of non-target, but potentially target, companies and then by averaging the differences in performance that take place between the target (treatment) and non-target (control) subsamples. In our analysis of average treatment effects we employ the Abadie and Imbens (AI hereafter) (2006) methodology 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 Dehejia and Wahba (2002) owing to the fact that it corrects for the presence of asymptotic bias in simpler matching procedures.

We measure the treatment effect by estimating the buy-and-hold abnormal returns (BHAR) to capture the impact of hedge fund engagements 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 e.g. target companies are undervalued relative to analyst valuations and their peers.

Next, we apply the AI (2006) matching procedure to identify a subgroup of the control firms with the same propensity to becoming targets as the actual targets themselves and estimate the average treatment effects of hedge fund intervention. We find that although the targets of HF activists experience significant performance improvements over the two years following the engagement, these improvements may not necessarily be due to hedge fund intervention. The matched control firms perform better than the targets on the same performance metrics. Thus, the counterfactual evidence is that the targets of activist campaigns could have achieved even stronger and more significant performance improvements were it not for the engagement of HF activists. This is evidenced by the significantly negative average treatment effects of BHAR following activist engagements over the

three-year period post announcement. The average post-hedge fund engagement BHAR to the targets is less than the corresponding average BHAR to the matched (non-target) subsample. The results are largely unchanged when the sample is broken down into groups depending on the activists' value proposition e.g. change in company governance, strategy or operations.

Unlike prior studies, we extend our study to the outcome of the HF campaign i.e. whether HFs win or incumbent managers win and do not implement any of the changes proposed by the activists. This innovation acknowledges that in a substantial minority of campaigns, the target managers see off the HFs and get further entrenched. We investigate whether such entrenchment worsens the operating performance of targets post-engagement and further destroys shareholder value. Since governance changes dominate the value propositions that HF campaigns advocate, we use a range of internal and external corporate governance metrics to track any deterioration in the governance characteristics of targets. Our analysis shows that the underperformance of targets is aggravated when HF campaign fails, triggered by deterioration in the internal and external governance characteristics of target firms and resulting in greater managerial entrenchment and higher agency costs. This performance decline is exacerbated, the longer the target CEO's tenure and the higher the proportion of the CEO's cash compensation. Our findings also show that the performance deterioration can be mitigated to some extent by increasing the independence of the board of directors and by removing the target firm's CEO.

Our results suggest that the observed short term value gains to target shareholders reflect hedge funds' stock-picking ability and not their contribution to the targets' long term operating performance and value creation changes they bring about. If anything their engagement seems to worsen the target firms' performance compared to that of non-target control firms. Thus, prior studies may have overstated the beneficial impact of HF activism by not carefully constructing the counterfactual case using models that account for endogeneity/ self-selection biases which we observe in our analysis. The detrimental influence of HF activism could be due to the likelihood that the changes that activists propose are inappropriate for the given target. It could also be simply because the pressure exerted by the activists' engagement serves 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. However, we also find that if HFs fail in their campaign and target managers become more entrenched, performance deterioration is even graver than when HFs win. This suggests that once the HF campaigns are launched, target shareholders lose if HFs win and lose even more if managers win. So HF win represents the better of the two bad bargains for target shareholders.

The analysis presented in this paper has important policy implications. It shows 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.

We contribute to the current debate on the value creation performance of activist hedge funds by providing evidence using robust methodology that takes into account that target selection by hedge funds is an endogenous decision and that the pre-existing characteristics of the target firms may determine the value gains reported by earlier studies. We provide the counterfactual evidence that, absent hedge fund activist intervention, firms that have the same profile as the actual targets and have the same propensity to be targeted, outperform them. Ours is the first paper that examines the changes in internal and external governance characteristics consequent upon HF wins and management wins and the impact that these changes have on target firm post-engagement operating performance and long term shareholder value. We provide evidence based on a large international sample while most prior studies have relied on US data.

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.

2. 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 bust-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. 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 (Gantchev, 2013). Activist hedge funds tend to be also 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 of small ownership positions in different stocks.

The recent evidence on the effect of HF 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 (in their Schedule 13D filing) 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.

Similarly, 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 of one month to 36 or 60 months after the departure of the hedge fund. Expected returns are calculated using the Fama-French four factor model. The authors report average 36-month (60-month) 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 engagement 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 engagement of HF 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 engagements in Europe between 2000 and 2008. The authors find significantly positive abnormal returns of 4.4% around the dates of block disclosures. 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.

Becht et al. (2015) analyse an international sample of 1,740 activist engagements between 2000 and 2010 and find that activist interventions with an 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 engagement of hedge funds can lead to positive alpha but that the size of returns is contingent upon the activist achieving the desired outcome from the intervention. The authors suggest that there is uncertainty the hedge funds will succeed in their campaign objectives and that the announcements of the outcomes serve to resolve this uncertainty.

Two 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 firm would have experienced an improvement in performance even in the absence of an engagement 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.

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 allows a hedge fund to take actions that 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 (see the Data and Methodology section below). 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 expenditure decreases following hedge fund engagement, companies experience and increase in patent counts and citations.

Our review of the extant literature shows that there are only two papers that explicitly examine the impact of governance characteristics on target firm performance following activist engagements. Becht et al. (2017) investigate the impact of country-level governance characteristics such as board independence (whether or not the average firm’s board is controlled by more than 50% of the board members who are independent directors), board structure (whether or not before an average firm’s board is annually elected and not staggered) and the quality of governance index as defined by Aggarwal et al. (2009) on the announcement period cumulative abnormal returns from activist engagements. The authors do not find any significant impact of the country-level variables on the engagement period announcement returns. Additionally, Fidrmuc and Kanoria (2017) study the impact of hedge fund activism on the corporate governance of a hand collected sample of 244 US targeted firms (from 2009 to 2011) by focusing on the changes in CEO compensation. They applied a matching procedure of a difference-in-differences approach between the sample of targets and a corresponding sample of matched firms for industry, size and book-to-market ratio. The study establishes that prior to activists’ intervention, the target CEOs received higher stock (restricted stock) and total compensation relative to the control group of matched firms, and following their entry this compensation was decreased close to the levels attained by the control peer group. Thus, the entry of hedge funds improved the monitoring

of target management and their incentive compensation mechanisms (pay-for-performance schemes) motivating CEOs to improve their firms' value.

To sum up, most recent studies show that the engagement 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 HF activists HF 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. The observed improvement in post-engagement performance in these studies 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 HF activists to certain companies may also be the factors that drive the observed increase in shareholder value creation following intervention. We therefore need to test the proposition whether, after controlling for these factors, hedge funds do add shareholder value and improve target firm's operating performance.

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 and whose performance provides the counter-factual evidence. In order to test this proposition, 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 HF 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.

3. Data and Methodology

3.1 Sample

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 engagements 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 2 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 HF 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 Tables 1& 2 about here]

Table 3, Panel A provides a breakdown of our sample per intervention outcome. We distinguish between *Completed* hedge fund engagements, where we were able to identify the outcome of the engagement by examining SEC and similar filings as well as performing news searches, and engagements 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 Win*) (HF Win hereafter) and those where the company managed to avoid having to implement *any* of the proposed changes (*Management Win or Mgt Win*). 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). It is noteworthy that in a substantial proportion of cases, targets managed to ward off the HFs.

[Please Insert Table 3 about here]

Table 3, Panel B shows the breakdown of our sample per engagement type. This table is based on the subsample of hedge fund engagements that we define as *HF Win*. 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 current strategic posture of the firm without proposing any specific strategic alternative, 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%).

3.2. 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 HF 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 shareholders over different event windows such as (t-1m, t+12m), (t-1m, t+24m) and (t-1m, t+36m).¹ 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 ROA over a period starting three years before and ending three years after each engagement.

3.3. Treatment effect estimation

¹ 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.

As noted in our review of extant literature above, 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 in more detail in Appendix 1) in order to perform this more direct and reliable technique for addressing self-selection/ endogeneity issues. This methodology also allows us to use a sample which consists of companies which belong to non-manufacturing as well as manufacturing industries.

Insert Table 1 here

Having identified a set of appropriate and possible 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 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.

4. Empirical Analysis

4.1. Probit model of likelihood of being HF activist target

To identify firms which have a profile similar to that of actual targets and the same propensity to becoming targets as the actual ones we construct a ‘predictive’ model of hedge fund targets. With such a model we can estimate the probability of firms 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 as many prior studies in our Literature Review above have done i.e using for example industry and size.²Therefore, we first identify a comprehensive set 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 a serious issue, we perform simple univariate analysis on the basis of our two samples: the (test) sample of actual targets and the sample of control firms. The results are presented in Table 4. Table 4 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 treatment effect of activism on company performance.

[Please Insert Table 4 about here]

We then estimate a probit regression model to predict the likelihood of becoming a target of hedge fund activism. We estimate two probit models presented in Table 5: one based on unadjusted financial characteristics (Model 1) and one based on industry-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 5 about here]

²Several 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 adopted i.e. Abadie and Imbens (2006).

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 fund³. We use the market capitalisation of companies measured one year before the announcement of the hedge fund engagement in order to account for the effect of company size. The results presented in Table 5 (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 HF 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 5, Model 1) while the industry-adjusted variable is not statistically significant (Table 5, 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 5, Model 1, it loads with a significantly positive coefficient when we use industry adjusted values (Table 5, Model 2).

³Formation of a 'wolf pack' with one hedge fund leader and several other hedge funds or other funds joining the pack during the disclosure period of 10 days under schedule 13D may reduce both the capital outlay and the risk exposure of the pack leader. On wolf packs see Coffee and Palia (2014) and Brav et al (2016).

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 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 5, 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. Jensen's (1986) 'free cash flow hypothesis' suggests that managers accumulate excess cash flow to increase the firm size to secure their own personal, rather than shareholders', interests and also avoid the discipline associated with debt by keeping their leverage low. This view 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*) and a measure of debt 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, 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 5, 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. Our results confirm these prior findings since the coefficients corresponding to the variable *Div_yield* are significantly negative (Table 5, Models 1 and 2). Following Klein and Zur (2009) we also account for the capital companies invest for the purpose of

organic growth⁴. Our variables, *Capex_sales* and *R&D_sales*, load with insignificant coefficients in our probit models (Table 5, 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 were achievable (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 and the market expectation based on peer performance (Table 5, 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 traded 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 5, 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 with high trading volume make it easier for the activist to acquire a significant ownership position before other, tag-along investors.

⁴Coffee and Palia (2014) argue that target managers may be forced by HF activism to cut back on long term investment such as on R & D and this may be reinforced by the greater leverage targets accept to satisfy some of the demands of the activists e.g. higher dividend payout or share buyback. This suggest that pre-engagement target firms have relatively high R & D expenditure.

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 5. This result 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.

To examine whether key internal and external corporate governance characteristics of the target firms change following activist engagements, we match the target and control firms with the BoardEx and Execucomp databases. We replace any missing information from BoardEx and Execucomp by searching the Proxy Statements, 10K and Prospectuses filed by the firms in our sample. Internal corporate governance characteristics are measured by board duality i.e. non-separation of the board chairman and CEO roles, board size, board composition, CEO compensation structure and CEO tenure. External governance characteristics are measured by analyst coverage, the number of institutional investors on the share register of the given company and the concentration of their ownership. Detailed definitions of the corporate governance characteristics examined in this study are provided in Table 1. We follow the methodologies in Brickley, Coles and Terry (1994), Coles, McWilliams and Sen (2001) when constructing the internal and external governance characteristics. Data on analyst coverage are obtained from the Institutional Brokers' Estimate System (IBES) database. We regress the changes in target firm performance on the changes in corporate governance characteristics to assess the impact of governance changes on post-engagement value-creation.

4.1 Short-term wealth effects from hedge fund activism

Table 6, Panel A 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 engagement. 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 Win* where the hedge fund's demands were partially or fully met, and d) *Management Win* where the company's management was able to avoid implementing the proposed changes. Cumulative abnormal returns are firm returns in excess of the benchmark i.e. the local market index of the target company. 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 generally increase with the size of the event window.

The magnitude of the CAR for the (-20, +20) window is 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% for all announced interventions, 7.3% for the completed interventions and 7.7% for the cases when the hedge fund was partially or completely successful. These results suggest that investors believe that the hedge fund's engagement will lead to an increase in the target firm valuation and an improvement in operational performance.

[Please Insert Table 6 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 effect 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.

Table 6, Panel B presents the announcement period CARs broken down per type of engagement. Similar to Panel A we report the CARs based on the local index benchmark. It should be noted that the CARs reported in Table 5 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%. The second largest CARs are associated with governance or strategic type interventions, with the (-20, +20) CARs amounting to 7.0%. Other types of engagement have CARs equal to 5.9%. 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.

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. may be reversed) over longer periods following the initial hedge fund engagement. 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.

4.2 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 the results of the analysis using the treatment effects estimated following the Abadie and Imbens (2006) methodology. Table 7, Panel A summarizes the change in BHAR over different time periods before and after the hedge fund engagement and provides a breakdown of the results per engagement outcome. Specifically, the table 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]

Most of the estimated treatment effects are either significantly negative or insignificantly different from zero. We note that there are some systematic differences depending on the winner. When the hedge funds successfully persuade management to implement the suggested changes the difference between the target and control firm performance is insignificant. If HFs win, the targets cease to underperform their control firms thereby reversing their underperformance in the pre-engagement period. This reversal testifies to the value creation impact of successful HF engagement. This interpretation is corroborated by the persistence of underperformance by targets when HFs fail and managers get more entrenched.

When the target firm’s management successfully avoids having to implement the proposed changes by the activist investors, the target firm performance is significantly worse compared to their peers. Specifically, we find that the $DinD_BHAR(t-1m; t+12m)$ and $DinD_BHAR(t-1m; t+36m)$ amount to -9.6% and -24.7% respectively. 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

HF activists underperform in the period before the activists' engagement, the degree of underperformance worsens following the activists' intervention. This is particularly the case for the outcomes where the target firm's management is able to see off the activist's engagement without implementing any of the HF-proposed changes. These results demonstrate that companies which become the targets of HF 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*. These results also suggest that in the cases when managers win, the target companies may suffer from relatively more severe managerial entrenchment and agency conflicts between management and shareholders. We investigate this issue further below.

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 7, Panel B with the average BHARs adjusted to the corresponding market index. 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, in the sub-samples of Strategic Direction, Governance and Restructuring type engagements generate negative and statistically insignificant average BHAR equal to -28.2%, -10.6%, and -38.0% respectively during the 24-month period following engagements. Additionally, engagements related to governance or restructuring changes generate significantly negative BHAR amounting to 19.2% respectively over the period starting 1 month before and ending 36 months after the announcement of the engagement. So irrespective of the type of change proposed by HFs, target shareholders experience value erosion rather than value addition from the engagements.

In Table 8 we repeat the analyses presented in Tables 6& 7 using return on equity (ROA) as the performance metric adjusted to the average ROA performance of industry peers where these industry peers are selected based on the Abadie and Imbens (2006) matching procedure. We find that hedge fund targets consistently underperform their industry peers during the first two years following the engagement. 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. In fact, over the two-year event

window we find that in the cases when managements win the degree of underperformance is larger compared to the cases when HFs win, the DinD_ROA being -8.5% in the former sub-sample and -7.4% in the latter sub-sample. This is consistent with the relatively benign outcome of HF engagement for target shareholders but the difference is quite small. The results are qualitatively similar when we examine the different types of engagements.

[Please Insert Tables 8 about here]

In sum our results suggest that the shareholder wealth improvement experienced by the targets of hedge fund activism as 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 short term 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. Importantly, our results also demonstrate that the degree of underperformance is greater in the cases when the target firm's management sees off the activist's engagement without implementing any of the proposed changes. This latter result points to the fact that in the cases when the managers win, the targets may suffer from managerial entrenchment and other agency conflicts between management and shareholders. We investigate this proposition further in the following section.

4.3 Target governance characteristics and the effects of hedge fund activism

To determine whether the target companies in cases of Mgt Win suffer from more severe managerial entrenchment issues, we first compare the financial characteristics of the sub-samples of targets where managers win and sub-sample of targets in the HF Win cases. The results are presented in Table 9.

Interestingly, we find that in the cases where ‘Management Win’ the degree of target firm underperformance prior to activist engagement is not as severe as the degree of pre-engagement underperformance of firms in the sub-sample of HF Wins. Specifically, we report a significant 4.6% worse underperformance in the latter cases. The pre-engagement average dividend yield and average price to free cash flow ratio in the cases when ‘Management Win’ are 0.144 and 1.070 lower than the cases when ‘HF Win’ respectively. We do not find any other statistically significant differences in terms of pre-engagement financial characteristics between the two groups.

[Please Insert Tables 9 about here]

To gain a deeper understanding of the corporate governance quality of target firms, we examine the pre-engagement internal and external governance characteristics of target firms relative to the control group which is identified based on the Abadie and Imbens (2006) matching procedure. The results are presented in Table 10, Panel A. Not surprisingly, the cash component of CEOs compensation is higher for the target firms prior to the engagement relative to the control firms, the average target CEO received \$741.6m in cash compensation while the average control firm CEO received \$687.8m in cash compensation during the two-year period prior to engagement announcement. In addition, the non-cash component of the CEO’s compensation was considerably lower in the sample of target firms relative to the sample of control firms. The average target firm’s CEO received a non-cash compensation amounting to \$59,457.7m while the average control firm’s CEO received a non-cash compensation amounting to \$145,134.8m. This observation suggests that the target firm’s CEOs compensation structure prior to HF intervention was more likely to result in agency conflicts and managerial entrenchment. The control firm’s CEOs compensation structure prior to intervention was more likely to result in better alignment of the interests of management and shareholders. Additionally, the cases where the roles of the CEO and the chairman overlapped were more frequent in the target firm sample relative to the control firm sample (average board duality in the target sample was 0.477 while the average board duality in the control sample was 0.400).

[Please Insert Tables 10 Panels A & B about here]

In terms of external governance characteristics such as the percentage of institutional ownership and the number of analysts following the company we observe that the degree of analyst coverage of target firms was slightly higher than the degree of analyst coverage of control firms. The average number of analysts that followed the target firms during the two-year period prior to HF intervention amounted to 10.065 while the average number of analysts following the control firm amounted to 8.870. The pre-engagement average levels of institutional ownership in the target and control firms were relatively similar (0.223 versus 0.231 for the samples of target and control firms respectively).

To gain a deeper understanding of the impact of HF interventions on the internal and external governance characteristics of the target firms we compare the change in these characteristic over two different windows around the year of engagement, namely we examine the change from two years before to two years after the intervention as well as the change from three years before to three years after HF intervention. In addition, we calculate the variable *DinD* which represents the difference between the change in the target firms and the change in the control sample of firms. The results for both windows are presented Table 10, Panel A. Our analysis demonstrates that the targets of HF activism experience significant improvements in some of the internal and external governance characteristics. Specifically, we observe that the incidence of overlapping roles of the CEO and chairman decreases significantly more in the sample of HF targets relative to the sample of control firms over the three-year period following HF intervention. In particular, the incidence of Board Duality decreases by 0.128 more in the HF target sample than the decrease observed in control sample. In addition, there is an increase in the level of board independence in the HF target sample over the same window which is 0.043 higher than the respective increase in the control sample and the cash compensation component of the target firm's CEOs decreases while the cash-compensation component of the control firm's CEOs increases over the three-year period following engagement, with a statistically significant difference between the two samples of -\$84.3m. Additionally, the CEO turnover in the target sample increases by a greater amount relative to the control sample over the same time period. Specifically, the CEO turnover for target firms increases by 0.088 more relative to the CEO turnover for control firms over the three-year period following HF intervention.

Our analysis also shows that there are significant improvements in the external governance characteristics of target firms as well relative to control firms. The percentage of institutional ownership in the target firms increases by a 0.062 more relative to the change in the control sample (in fact the proportion of institutional ownership in the control sample decreases marginally). Additionally, the number of analysts covering the target firms increases by a greater amount relative to the respective change observed in the control sample. In particular, the Analyst coverage variable increases by 0.418 more relative to the increase Analyst Coverage in the control firms during the three-year period following HF intervention. Overall, HF engagement leads to significant governance improvement in targets. Next, we analyse whether these improvements are limited to cases of HF win.

We compare the change in governance characteristics between the HF Win sub-sample and the Mgt Win subsample. This analysis, presented in Table 10, Panel B, would help us determine whether the agency problems and managerial entrenchment are relatively become more severe with Mgt Win. We find that while the cash compensation component of CEO's remuneration package decreases in the sub-sample of HF win, the cash compensation component increases in the sub-sample of management win, with a statistically significant difference of \$18.3m over the three-year period following intervention. Additionally, the CEO turnover increases by a significantly higher amount (0.246) in the sub-sample of HF win relative to the sub-sample of management win over the three-year period following activist engagement. In addition, albeit insignificant, there is less duality, more board independence and higher non-cash compensation in the HF Win targets than in the Mgt Win targets.

Regarding changes in external governance characteristics variables, we find that both the percentage of institutional ownership and the number of analysts covering the company increase by a greater proportion in the HF Win sub-sample relative to the Mgt Win sub-sample, with statistically significant difference of -0.015 and -0.871 respectively over the three-year period following intervention. Overall, these results suggest that the target firms where managers win are likely to suffer from more severe agency problems and that these problems are exacerbated during the three year period following HF engagement.

To determine the impact on post-engagement performance of the two possible outcomes, namely management win and HF win in a more robust model, we perform regression analysis of the change in shareholder value and accounting performance following HF intervention. The results are presented in Table 11. Panel A shows the results where the dependent variable is the *DinD_BHAR* and Panel B shows the results where the dependent variable is *DinD_ROA*. In each regression model, the change in the dependent variable for each target firm is calculated relative to the change in the same variable for each control firm. The Abadie and Imbens (2006) matching procedure is used to identify the control firm in each case. The results are reported based on one-to-one matching, however, our findings are unchanged when we use higher number of control firms for each target firm. Note that we control for the target financial characteristics as well as certain campaign characteristics in our regression model to ensure that our results do not suffer from omitted variable bias.⁵ Our results demonstrate that HF targets underperform their peers significantly more in the cases when management win. This is evidenced by the negative and significant coefficient corresponding to the dummy variable *Mgt. Win* in all models presented in Table 11.

To determine whether this difference in target performance following engagements is driven by changes in the governance characteristics of target firms we include the measures of internal and external governance quality in our analysis and we interact these variables with our management win dummy. This allows us to identify whether the deterioration in performance in the sub-sample of management win targets is driven by deteriorating quality of corporate governance that can lead to more severe agency conflicts and managerial entrenchment in that sample. Our findings provide evidence in support of this expectation. Specifically, we find that post-engagement share price performance is significantly worse in the sub-sample of management win when the CEO's cash compensation increases following the HF intervention. This is evidenced by the negative and significant coefficient corresponding to the interaction term between the variable which measures change in CEO's cash

⁵A full list of the control variables used in the regression analysis can be found in the notes to Table 11. Detailed variable definitions are provided in Table 1.

compensation (*DinD_Δ CEO's Cash Comp.*) and the dummy variable for cases when management win (*Mgt. Win*) in all the models presented in Table 11, Panel A.

Our analysis also suggests that, in the cases when management win, the extent of managerial entrenchment and associated agency costs can be alleviated by increasing the percentage of non-executive directors on the target firm's board of directors. This is evidenced by the positive and significant coefficient corresponding to the interaction term between the variable which measures the degree of board independence (*DinD_Δ Board Indep.*) and the dummy variable for cases when management win (*Mgt. Win*) in all the models presented in Table 11, Panel A. The extent of share price underperformance can also be alleviated by changing the target firm's CEO following cases where activists fail to implement the proposed changes i.e. in Mgt Win cases. This is evidenced by the positive and significant coefficient corresponding to the interaction term between the dummy variable which captures the cases when the target firm' CEO was changed (*DinD_CEO Change*) and the dummy variable for cases when management win (*Mgt. Win*) in models 1 and 2 in Table 11, Panel A.

Our conclusions are qualitatively similar when we examine the change in target company performance based on our measure of operating performance, namely the variable *DinD_ROA*.⁶Our analysis shows that the degree of target firm operating underperformance is aggravated in the cases when management win leading to longer CEO tenure. This finding is confirmed by the negative and significant coefficient corresponding to the interaction term between change in CEO tenure (*DinD_CEO Tenure*) *Mgt. Win* in Models 1 and 2 in Table 11, Panel B. Our analysis also demonstrates that, in the cases where managements win, the extent of managerial entrenchment and associated agency costs can be alleviated by increasing the degree of board independence. This is evidenced by the negative and significant coefficient corresponding to the interaction term between the dummy variable for the chairman and CEO overlap (*DinD_Duality*) and *Mgt. Win* in Models 1 and 2 in Table 11, Panel B.

⁶In unreported results, we also replicate this analysis using the *DinD_ROE* variable. Our findings remain unchanged.

Overall, our analysis shows that some target firms experience significant improvements in the quality of internal and external governance mechanisms, and more so in targets where HFs win their campaign, and these improvements can help mitigate the underperformance experienced by HF targets. In the cases where management win, activist targets tend to experience a worsening in the quality of corporate governance and this is likely to lead to increased agency costs associated with managerial entrenchment. Such adverse consequences of Mgt Win can, however, be alleviated by increasing the independence of target firms' boards of directors and changing the target firms' CEOs.

5. Conclusions

Impact of hedge fund activism on the operating and shareholder value performance of the target firms has been the subject of many recent studies (e.g. Brav et al.2008; Klein and Zur, 2009; Bessler et al., 2015; Becht et al., 2015; Becht et al., 2017; and Bebchuk et al., 2015). We extend the current literature in at least three ways: 1. we demonstrate that the impact of such activism, contrary to extant evidence, is negative in terms of long term operating performance and shareholder value, when benchmarked against a rigorously constructed counterfactual case of no HF intervention; 2. the outcome of HF campaigns has important implications for the post-engagement performance of target firms with HF wins and management wins having differential impact in terms of governance improvement, operating performance and shareholder value gains; and 3. where HF campaigns fail, incumbent managers get more entrenched and inflict more deleterious consequences for target governance, its operating performance and shareholder value experience. Some governance improvements moderate the value decline following management wins.

We adopt the Abadie and Imbens (2006) methodology to account for the endogeneity of the HF engagement decision, construct a robust counterfactual case for such engagement and show suggest that HF activists are good stock-pickers but their engagement *per se* does not improve long term performance relative to the counterfactual case. However, where they win their campaign and induce target managers to implement the changes they advocate, HFs are able to reverse the relative underperformance of their targets. This they achieve by inducing significant internal and external

governance changes in the targets. The consequences of their failure resulting in greater managerial entrenchment are, however, more dire. Such entrenchment inhibits governance improvement and causes greater operating performance decline and shareholder value erosion.

The first takeaway from our study is that HF engagement is bad news but the worse news is that managers see off the HFs and get more entrenched. The second is that in assessing the impact of HF activism researchers must endeavour to construct the appropriate counterfactual case so that they do not misattribute the performance consequences to HFs' engagement *per se*. The third is that the analysis of the impact must extend beyond the mere campaign to a more fine-grained analysis of who wins and the consequences the winners visit upon target firms.

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 HF 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 HF activists.

Future research can explore these issues. In our study, we focused only on the governance changes in targets to explain the post-campaign performance outcomes. Future research can encompass other campaign themes and the changes such as restructuring they advocate. Our sample is international but we did not undertake separate analyses of HF activism in different countries/ regions. With larger subsamples from those countries and regions, future research can shed interesting light on how HF activism varies, how differences in the legal and regulatory regimes impact on activism and how the consequences of such activism vary across countries and regions.

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Table 1. Variable Definitions

Name	Definition
Institutional Ownership Year 0	The proportion of shares outstanding that is held by institutional investors in the year of activist engagement.
Average Amihud Illiquidity (-120 days to -60 days)	The average value of the ratio of the daily absolute return to the (dollar) trading volume on the day. The average is measured over a period starting 120 days before and ending 60 days after the announcement of the activist campaign. This ratio captures the absolute (percentage) price change per dollar of daily trading volume, or the daily price impact of the order flow.
Closely held shares	the percentage of shares that are owned by company insiders
Average Volume Traded (-120 days to -60 days)	The average value of the daily (dollar) traded volume. The average is measured over a period starting 120 days before and ending 60 days after the announcement of the activist campaign. We take the natural logarithm of this variable for the purposes of the regression analysis.
Market capitalisation (log) Year -1	The market capitalization of the target company is measured as of the end of the fiscal year prior to the year of activist engagement. We take the natural logarithm of this variable for the purposes of the regression analysis.
ROA Y-1	Net income before payment of interest divided by total assets. The ROA of the target company is measured as of the end of the fiscal year prior to the year of activist engagement.
Sales growth (Year-3 to Year-1)	Measure of the annual sales growth of the target company during the three years before the announcement of the activist engagement.
Cash to Assets Year-1	Measure of the target company's liquidity given by the ratio of cash to total assets as of the end of the fiscal year prior to the year of activist engagement.
Earnings Surprise Year -1	Percentage difference between the earning per share outcome for each company relative to analyst consensus estimates. This variable is measured as of the end of the fiscal year prior to the year of activist engagement.
Market to book Year -1	The ratio of market capitalisation to book value of equity of the target company. This variable is measured as of the end of the fiscal year prior to the year of activist engagement.
CAAR (-120 days to -60 days)	Cumulative Average Abnormal Returns of the target company. The average is measured over a period starting 120 days before and ending 60 days after the announcement of the activist campaign. Abnormal returns are calculated relative to each target company's local index as identified by the Datastream database.
Board duality	Dummy variable equal to one if the CEO of firm is also chairman of the board of directors and zero otherwise.* (Source: BoardEx, Edgar)
Board size	Number of board directors.* (Source: BoardEx, Edgar)
Board indep.	Number of non-executive directors/number of executive directors (Non-executive directors is used in BoardEx).* (Source: BoardEx, Edgar)
Share of instit. investors	Proportion of shares owned by institutional investors.* (Source: Edgar)
CEO cash comp.	Sum of salary and bonus (Zajac and Westphal, 1994; Feldman, 2016).* (Source: BoardEx, Execucomp, Edgar)
CEO non-cash comp.	CEO's total compensation <i>minus</i> his/her cash compensation (Zajac and Westphal, 1994; Feldman, 2016).* (Source: BoardEx, Execucomp, Edgar)
CEO tenure	Number of years since the CEO was appointed to that position.* (Source: BoardEx, Execucomp, Edgar)

Name	Definition
Analyst coverage	Analyst coverage for a given year calculated as average of the monthly number of analysts who cover the given stock. For the conglomerate, we combine the analyst coverage of the offspring in the post-ECO period and the analyst coverage of the parent (Gilson et al., 2001).* (Source: IBES)
Campaign length (log)	The number of days between initial disclosure and exit of the activist investor. We take the natural logarithm of this variable for the purposes of the regression analysis.
Previous target	A dummy variable which indicates whether (1) or not (0) a given company is a previous target of activist investors in our sample.
Ownership at start of campaign	The stake of the activist investor at the announcement of the engagement.
Activist Wolf Pack Dummy	A dummy variable which indicates whether (1) or not (0) multiple activist investors engage the company at the same time.
Abnormal Turnover by Other Investors	The average abnormal turnover driven by investors other than the hedge fund activist over a period starting 60 days before and ending 60 days after the campaign announcement.
HF Win	Activist engagements where the hedge fund was successful in achieving <i>at least one</i> of the proposed changes
Mgt. Win	Activist engagements where the company managed to avoid having to implement <i>any</i> of the proposed changes
Governance	<i>Governance</i> related change, where the hedge fund seeks to obtain board representation, improve shareholder rights, change company management or management's compensation, etc.,
Strategy	<i>Strategy</i> related change where the hedge fund is challenging the current strategic posture of the firm without proposing any specific strategic alternative,
Restructuring	<i>Restructuring</i> related change where the proposed change is related to performing a spin-off, partial or full sale of the company's assets
Other	<i>Other</i> types of proposed change that do not fall into the three broad categories presented above.
Price to free cash flow Year -1	The ratio of price to free cash flow. This variable is measured as of the end of the fiscal year prior to the year of activist engagement.
Forward P/E ratio Year -1	The forward price earnings ratio measured as of the end of the fiscal year prior to the year of activist engagement.
<i>Undervaluation</i>	The difference between each company's share price and the broker target price.
<i>Return on Capital Employed</i> Year -1	Return on capital employed as of one year before the HF intervention.
R&D to sales Year -1	The ratio of research and development expense to sales. This variable is measured as of the end of the fiscal year prior to the year of activist engagement.
Share turnover	Measured as share volume divided by adjusted shares outstanding.
Dividend yield Year -1	The ratio of dividend per share to price per share. This variable is measured as of the end of the fiscal year prior to the year of activist engagement.
Capex to sales Year -1	The ratio of capital expenditures to sales. This variable is measured as of the end of the fiscal year prior to the year of activist engagement.
Net debt to market cap Year -1	The ratio of net debt to market capitalisation. This variable is measured as of the end of the fiscal year prior to the year of activist engagement.
Total return (3-year)	The three-year growth in the total returns index for each company before the activist's engagement.

Table 2. 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 2000 - 2014. The sample of hedge fund engagements is obtained from the Thomson One Banker database.

Table 3. Sample distribution per outcome and type

Panel A: Activist engagements by outcome

Engagement outcome	Number of engagements	Percent
Completed	1,447	82.7%
HF Win	1,036	49.3%
Mgt. Win	714	33.4%
Total	1,750	100%

Panel B: Activist engagements by type

Engagement type	Number of engagements	Percent
Governance	911	87.7%
Strategic Direction	259	25.1%
Restructuring	155	14.7%
Other	18	1.7%
Total	1,036	-

Notes: The sample covers the period 2000 - 2014. The sample of hedge fund engagements is obtained from the Thomson One Banker database.

Table 4. Sample descriptive statistics, industry-adjusted values.

Variable	Activist targets (A)	Controls (B)	Mean comparison
	Mean	Mean	test (B) – (A)
Total return (3-year)	-0.097	0.000	0.097*** (8.9143)
Net debt to market cap	0.060	-0.047	-0.107*** (-3.0191)
Return on capital employed	-0.077	0.002	0.078*** (18.6868)
Undervaluation	-0.073	0.007	0.080*** (11.1485)
Forward P/E ratio	-3.372	-0.317	3.056*** (5.6834)
Earnings surprise	-0.240	-0.005	0.235*** (12.3853)
Sales growth (3-year)	-0.050	-0.007	0.043*** (5.0098)
Capex to sales	-0.006	-0.001	0.005 (0.7927)
Dividend yield	-0.663	-0.003	0.660*** (12.417)
Price to free cash flow	-0.394	-0.063	0.331 (0.131)
Market to book	-0.361	-0.050	0.312*** (4.696)
Cash to total assets	0.027	0.001	-0.026*** (-6.010)

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. T-stats are reported in parentheses.

Table 5. Probit model of likelihood of becoming the target

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. We include year, industry and country fixed effects in each regression model. T-stats are reported in parentheses.

Table 6. Analysis of cumulative average abnormal returns (CAAR) around the announcement of activist engagements.

Panel A: Breakdown per engagement outcome

Average	All Announced	Completed	HF Win	Mgt.Win
CAAR(t-1d; t+1d)	0.032*** 5.033	0.034*** 5.102	0.034*** 13.603	0.034** 2.077
CAAR(t-2d; t+2d)	0.067*** 8.143	0.063*** 7.359	0.065*** 20.174	0.061*** 2.866
CAAR(t-10d; t+10d)	0.080*** 3.358	0.062*** 3.546	0.064*** 9.730	0.060 1.379
CAAR(t-20d; t+20d)	0.061*** 3.599	0.076*** 3.100	0.080*** 8.725	0.070 1.155
Number of observations	1,750	1,447	863	584

Panel B: Breakdown per engagement type

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

Notes: This table reports the cumulative average abnormal returns that accrue to targets of activist engagements. The sample is broken down per engagement outcome in Panel A and engagement type in Panel B. 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. T-stats are reported in parentheses.

Table 7. Analysis of buy-and-hold abnormal returns (BHAR) following activist engagements.

Panel A: Breakdown per engagement outcome

Engagement Outcome	All Announced	Completed	HF Win	Mgt.Win
Average Treatment Effects (adjusted for matched control firm BHAR)				
DinD_BHAR (t-1m; t+12m)	-0.058** 0.029	-0.063** 0.030	-0.043 0.037	-0.096* 0.050
DinD_BHAR (t-1m; t+24m)	-0.089* 0.048	-0.086* 0.050	-0.059 0.064	-0.130 0.080
DinD_BHAR (t-1m; t+36m)	-0.178** 0.076	-0.163** 0.076	-0.099 0.097	-0.247** 0.120
Number of observations	1,342	1,215	698	517

Panel B: Breakdown per engagement type

Engagement Type	Strategic Direction	Governance	Restructuring	Other
Average Treatment Effects (adjusted for matched control firm BHAR)				
DinD_BHAR (t-1m; t+12m)	-0.115 0.094	-0.096*** 0.035	-0.154 0.106	-0.061 0.039
DinD_BHAR (t-1m; t+24m)	-0.282** 0.127	-0.106* 0.060	-0.380** 0.166	-0.152** 0.064
DinD_BHAR (t-1m; t+36m)	-0.173 0.287	-0.192** 0.092	-0.288 0.176	-0.261*** 0.081
Number of observations	217	757	127	15

Notes: The sample covers the period 2000 - 2014. Panel A shows the change in share price performance per engagement outcome and Panel B shows the change in share price performance per engagement type. The analysis is based on calculating the difference in difference change in Buy-and-Hold Abnormal Returns (BHAR) following activist engagements over three different event windows, namely, (t-1m; t+12m), (t-1m; t+24m) and (t-1m; t+36m). The control sample is selected using the Abadie and Imbens (2006) matching procedure. *DinD_BHAR* captures the treatment effects difference between change for treated observations and change for corresponding control observations. Standard errors are reported in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% levels respectively.

Table 8. Analysis of return on equity (ROA) following activist engagements: breakdown per engagement outcome and type.

Panel A: Breakdown per engagement outcome

Engagement Outcome	All Announced	Completed	HF Win	Mgt.Win
Average Treatment Effects (adjusted for matched control firm ROA)				
DinD_Δ ROA(t-1y; t+1y)	-0.072*** 0.023	-0.069*** 0.026	-0.076** 0.030	-0.065** 0.033
DinD_Δ ROA(t-1y; t+2y)	-0.089*** 0.027	-0.090*** 0.029	-0.074** 0.034	-0.085** 0.036
DinD_Δ ROA(t-1y; t+3y)	-0.043* 0.024	-0.034 0.026	0.001 0.049	-0.046 0.030
Number of observations	1,342	1,215	698	517

Panel B: Breakdown per engagement type

Engagement Type	Strategic Direction	Governance	Restructuring	Other
Average Treatment Effects (adjusted for matched control firm ROA)				
DinD_Δ ROA(t-1y; t+1y)	-0.111** 0.046	-0.055** 0.026	-0.087** 0.041	-0.100 0.089
DinD_Δ ROA(t-1y; t+2y)	-0.147*** 0.051	-0.111*** 0.028	-0.165*** 0.052	-0.096* 0.055
DinD_Δ ROA(t-1y; t+3y)	-0.040 0.055	-0.065* 0.036	-0.098 0.087	-0.038 0.128
Number of observations	217	757	127	15

Notes: The sample covers the period 2000 - 2014. Panel A shows the change in share price performance per engagement outcome and Panel B shows the change in share price performance per engagement type. The analysis is based on calculating the difference in difference change in return on assets (ROA) following activist engagements over three different event windows, namely, (t-1m; t+12m), (t-1m; t+24m) and (t-1m; t+36m). The control sample is selected using the Abadie and Imbens (2006) matching procedure. *DinD_ROA* captures the treatment effects difference between change for treated observations and change for corresponding control observations. Standard errors are reported in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% levels respectively.

Table 9. Comparison of target characteristics between HF Win and Mgt. Win

Variable Name	Mgt. Win	HF Win	Difference (HF Win – Mgt. Win)	t-stat
Total return (3-year)	-0.071	-0.117	0.046**	1.867
Net debt to market cap	-0.005	0.050	-0.055	-0.620
Return on capital employed	-0.069	-0.072	0.003	0.220
Undervaluation	-0.073	-0.077	0.004	0.247
Forward P/E ratio	1.340	-0.202	1.542	0.722
Earnings surprise	-0.237	-0.218	-0.019	-0.431
Sales growth (3-year)	-0.046	-0.046	0.0002	0.011
Capex to sales	-0.007	-0.016	0.009	0.651
Dividend yield	-0.718	-0.574	-0.144*	-1.323
Price to free cash flow	-1.927	-0.858	-1.070**	-1.674
Market to book	-0.348	-0.290	-0.058	-0.360
Cash to total assets	0.039	0.023	0.016	1.276
Market cap.	2656.01	2833.27	-177.26	-0.355
R&D to sales	-1.414	-1.059	-0.355	-1.181
Closely Held Shares	-0.067	-0.064	-0.003	-0.232
Share turnover	1.745	1.773	-0.028	-0.134
Mgt. Win	517	517	517	517
HF Win	698	698	698	698

Notes: This table compares the target firm financial characteristics between the sub-samples of HF Win and Mgt. Win. 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.

Table 10. Univariate analysis of the change in corporate governance characteristics of target firms.

Panel A: Change in internal and external governance characteristics of target firms relative to control firms

Average	Board duality	Board size	Board indep.	CEO cash comp. (Million USD)	CEO non-cash comp. (Million USD)	CEO tenure	CEO Turnover	Institutional Ownership Percentage	Analyst Coverage
<i>Change over the time window (t-2y; t+2y)</i>									
Target Before	0.477	10.850	0.684	741.6	59,457.7	5.105	0.370	0.223	10.065
Target After	0.303	11.929	0.735	732.7	39,045.0	4.303	0.720	0.248	10.784
Change Target	-0.174	1.079	0.051	-8.9	-20,412.7	-0.802	0.350	0.025	0.719
Control Before	0.400	10.946	0.629	687.8	145,134.8	4.300	0.208	0.231	8.870
Control After	0.341	11.580	0.644	739.9	117,134.3	4.262	0.399	0.228	9.390
Change Control	-0.059	0.634	0.015	52.1	-28,000.5	-0.038	0.191	-0.003	0.520
<i>DinD</i>	-0.115***	0.445	0.036***	-61.2**	7,587.8	-0.764**	0.159***	0.028***	0.199***
t-stat	(-3.359)	(0.507)	(5.571)	(-2.095)	(0.724)	(-1.992)	(3.098)	(2.720)	(2.952)
<i>Change over the time window (t-3y; t+3y)</i>									
Target Before	0.502	10.799	0.673	737.5	57321.3	5.003	0.261	0.205	9.876
Target After	0.307	11.949	0.739	717.8	40728.0	4.410	0.504	0.258	10.581
Change Target	-0.195	1.150	0.066	-19.7	-16593.3	-0.593	0.243	0.053	0.705
Control Before	0.401	10.926	0.622	672.9	143316.1	4.534	0.169	0.210	8.800
Control After	0.334	11.553	0.645	737.5	123457.5	4.101	0.324	0.201	9.087
Change Control	-0.067	0.627	0.023	64.6	-19858.6	-0.433	0.155	-0.009	0.287
<i>DinD</i>	-0.128**	0.523	0.043***	-84.3***	3265.3	-0.160	0.088***	0.062***	0.418***
t-stat	(-2.604)	(0.731)	(2.721)	(-2.728)	-0.946	(-0.906)	(2.962)	(2.770)	(2.970)
Number of controls	1,215	1,215	1,215	1,215	1,215	1,215	1,215	1,215	1,215
Number of targets	1,215	1,215	1,215	1,215	1,215	1,215	1,215	1,215	1,215

Panel B: Change in internal and external governance characteristics of target where management wins relative to targets where activists wins

Average	Board duality	Board size	Board indep.	CEO cash comp. (Million USD)	CEO non-cash comp. (Million USD)	CEO tenure	CEO Turnover	Institutional Ownership Percentage	Analyst Coverage
<i>Change over the time window (t-2y; t+2y)</i>									
Change Mgt. Win	-0.075	-0.436	0.037	-1.1	-22943.5	-0.173	0.119	0.016	0.169
Change HF Win	-0.255	1.664	0.062	-18.6	19276.1	-0.908	0.462	0.044	0.927
Difference (Mgt. Win – HF Win)	0.180	-2.101	-0.025	17.5**	-42219.6	0.735	-0.343**	-0.028**	-0.758**
t-stat	(0.524)	(-1.048)	(-0.847)	(2.201)	(-0.503)	(0.641)	(-1.931)	(-2.050)	(-2.283)
<i>Change over the time window (t-3y; t+3y)</i>									
Change Mgt. Win	-0.058	-0.463	0.056	-5.3	-76316.4	-0.078	0.133	0.047	0.208
Change HF Win	-0.269	1.632	0.084	-23.6	11998.1	-0.636	0.379	0.062	1.079
Difference (Mgt. Win – HF Win)	0.211	-2.095	-0.028	18.3*	-88314.5	0.558	-0.246**	-0.015**	-0.871***
t-stat	(0.649)	(-0.975)	(-0.371)	(1.702)	(-1.227)	(0.902)	(-1.973)	(-2.490)	(-2.763)
Number of targets with Mgt. win	517	517	517	517	517	517	517	517	517
Number of targets with HF win	698	698	698	698	698	698	698	698	698

Notes: *Before* is the average of the given governance characteristic for each firm calculated over a period of two (or three) years before hedge fund engagement. *After* is the average of the given governance characteristic for each firm calculated over a period of two (or three) years after hedge fund engagement. The variable *Change* is defined as the difference between *Before* and *After*. T-stats are reported in parentheses. *** indicates significance at the 1% level, ** indicates significance at the 5% level, and * indicates significance at the 10% level. For detailed definitions of the governance variables please refer to Table 1.

Table 11. Regression analysis of target performance following activist engagements.

Panel A: Analysis of buy-and-hold abnormal returns (BHAR)

VARIABLES	Model 1: DinD_BHAR (t-1m; t+12m)	Model 2: DinD_BHAR (t-1m; t+24m)	Model 3: DinD_BHAR (t-1m; t+36m)
<i>Governance Characteristics</i>			
Mgt. Win	-1.029*** (-2.786)	-1.522*** (-2.708)	-1.425** (-1.917)
DinD_Δ Board Size x Mgt. Win	0.084 (0.951)	0.221 (1.566)	0.070 (0.837)
DinD_Δ Board Size	-0.022 (-0.457)	-0.030 (-0.426)	-0.009 (-0.233)
DinD_Δ Board Indep. x Mgt. Win	1.155*** (4.034)	1.546*** (3.178)	0.749*** (2.822)
DinD_Δ Board Indep.	-0.354* (-1.811)	-0.270 (-0.987)	-0.191 (-1.349)
DinD_Δ CEO's Cash Comp. x Mgt. Win	-0.026** (-2.279)	-0.038** (-2.245)	-0.017* (-1.759)
DinD_Δ CEO's Cash Comp.	-0.013 (-0.661)	-0.014 (-0.468)	-0.017 (-0.105)
DinD_Δ CEO's Equity Comp. x Mgt. Win	0.030 (0.203)	0.076 (0.339)	0.073 (0.538)
DinD_Δ CEO's Equity Comp.	-0.101 (-1.402)	-0.176 (-1.643)	-0.511 (-0.876)
DinD_Duality x Mgt. Win	0.209 (0.767)	0.239 (0.677)	0.215 (0.954)
DinD_Duality	0.0775 (0.496)	0.121 (0.647)	0.0462 (0.374)
DinD_CEO Tenure x Mgt. Win	0.0342 (0.586)	0.094 (1.122)	-0.016 (-0.0306)
DinD_CEO Tenure	0.031 (1.161)	0.0353 (0.900)	0.0295 (1.415)
DinD_CEO Change x Mgt. Win	0.593** (2.008)	0.908** (2.349)	0.328 (1.258)
DinD_CEO Change	-0.339 (-1.640)	-0.482* (-1.816)	-0.161 (-1.060)
DinD_Δ Institutional Ownership x Mgt. Win	0.521 (0.842)	0.801 (1.284)	0.951 (1.197)
DinD_Δ Institutional Ownership	0.939** (-2.268)	1.476** (-2.075)	0.599** (-2.019)
DinD_Δ Analyst Coverage x Mgt. Win	0.198 (0.715)	0.557 (0.948)	0.864 (1.430)
DinD_Δ Analyst Coverage	0.019 (1.134)	0.011 (0.399)	0.013 (1.052)
Campaign and Ownership Characteristics	Yes	Yes	Yes
Industry, Country and Year FE	Yes	Yes	Yes
Observations	1,215	1,215	1,215
R-squared	0.418	0.383	0.424

Panel B: Analysis of change in ROA

VARIABLES	Model 1: DinD_ROA (t-1y; t+1y)	Model 2: DinD_ROA (t-2y; t+2y)	Model 3: DinD_ROA (t-3y; t+3y)
<i>Governance Characteristics</i>			
Mgt. Win	-4.421* (-1.689)	-6.178** (-2.430)	-7.587** (-2.059)
DinD_Δ Board Size x Mgt. Win	0.192 (1.488)	0.0364 (0.331)	0.514** (2.598)
DinD_Δ Board Size	-0.0402 (-0.156)	0.327 (1.444)	0.416 (1.443)
DinD_Δ Board Indep. x Mgt. Win	-0.714 (-0.340)	0.343 (1.503)	0.274 (0.836)
DinD_Δ Board Indep.	-0.287 (-0.268)	-0.154 (-1.432)	-0.202 (-1.470)
DinD_Δ CEO's Cash Comp. x Mgt. Win	0.182 (0.893)	0.193 (0.681)	-0.350 (-1.120)
DinD_Δ CEO's Cash Comp.	-0.076 (-0.690)	-0.051 (-0.482)	0.013 (0.950)
DinD_Δ CEO's Equity Comp. x Mgt. Win	0.573 (0.0290)	0.818 (0.297)	0.448 (1.469)
DinD_Δ CEO's Equity Comp.	0.554 (0.215)	0.119 (0.387)	0.272 (0.481)
DinD_Duality x Mgt. Win	-0.188* (-1.731)	-0.256* (-1.958)	0.537 (0.352)
DinD_Duality	0.115* (1.966)	0.381 (0.653)	1.008 (1.254)
DinD_CEO Tenure x Mgt. Win	-0.573*** (-3.129)	-0.613*** (-2.754)	-0.0909 (-0.385)
DinD_CEO Tenure	0.324** (2.483)	0.323** (2.023)	0.0166 (0.119)
DinD_CEO Change x Mgt. Win	0.334 (0.256)	0.738 (0.552)	0.404 (0.241)
DinD_CEO Change	-0.527 (-0.607)	-0.255 (-0.272)	-0.640 (-0.596)
DinD_Δ Institutional Ownership x Mgt. Win	0.416 (0.615)	0.272 (1.076)	0.311 (0.532)
DinD_Δ Institutional Ownership	-2.504 (-1.227)	-3.379* (-1.813)	-6.086 (-1.553)
DinD_Δ Analyst Coverage x Mgt. Win	0.198 (0.278)	0.195 (1.559)	0.540 (0.816)
DinD_Δ Analyst Coverage	-0.121* (-1.831)	-0.138 (-1.465)	-0.113 (-1.284)
Campaign and Ownership Characteristics	Yes	Yes	Yes
Industry, Country and Year FE	Yes	Yes	Yes
Observations	1,215	1,215	1,215
R-squared	0.345	0.343	0.354

Notes: The sample covers the period 2000 - 2014. Robust t-statistics are presented in parentheses. Models 1 through 3 are least square regressions which examine the performance of targets following the engagement of activist investors. The dependent variable in (Panel A) measures the Buy-and-Hold abnormal returns (BHAR) over three different event windows, namely, (t-1m; t+12m), (t-1m; t+24m) and (t-1m; t+36m). Post-engagement performance in Panel B is measured using the change in ROA over three different event windows, namely, (t-1y; t+1y), (t-1y; t+2y) and (t-1y; t+3y). BHAR and ROA are adjusted to each target company's non-target peer which is identified using the Abadie and Imbens (2006) matching procedure. Campaign characteristics include: Campaign length (log), Previous target, Activist Wolf Pack Dummy and Ownership at start of campaign. Ownership characteristics include Average Amihud Illiquidity (-120 days to -60 days), Closely held shares, Average Volume Traded (-120 days to -60 days) and Institutional ownership year 0. For detailed

definitions of these variables please refer to Table 1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. T-stats are reported in parentheses.

Appendix 1. The Abadie and Imbens (2006) Treatment Effects Estimation

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 engagement (i.e. treatment took place). In our analysis we examine the change in $S_n(T)$ relative to its level before the hedge fund engagement, 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 engagement. 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 engagement. This condition would only be true if hedge fund engagement 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 only 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, 1973a,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 n^{th} 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 $DinD_BHAR$ as the difference between the average BHAR which accrue to investors in target and non-target companies. Using $BHAR_{t-1m \text{ to } t+12m}$ as an example, the variable $DinD_BHAR(t-1m; t+12m)$ shows the average value of:

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

Whenever the variables $DinD_BHAR$ and $DinD_ROA$ are significantly greater than zero, we interpret this result as evidence that the given improvement in performance is driven by the hedge fund engagement *per se* and not by the inherent characteristics of the treated firm.