Analyzing the Long-Term Performance of Activist Targets

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Activist investors claim they enhance shareholder value by enacting lasting operational improvements at their targets, while critics assert that activists extract short-term returns from targets in exchange for deteriorating long-term performance. In an effort to contribute to this debate, I examine a dataset of North American activist targets from 1995 – 2011 to test whether activists improve the corporate performance of their targets in the long run. I track each target for three years post-intervention and find that activists improve the performance of their targets for up to three years post-intervention. Additionally, I find no difference in activists' success between the periods before and after the Financial Crisis. In an interesting result regarding the technology industry, I discover that activists are able to improve asset efficiency for technology targets better than for targets in other sectors. However, they have less success in improving the market valuation of technology targets than for similar targets in other industries.

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I. INTRODUCTION AND LITERATURE REVIEW

While investment firms and hedge funds have been around for decades, a new investment vehicle has risen to prominence since the Financial Crisis: activist hedge funds, which build up large stakes in companies and agitate for operational change. Assets under management for activist investors skyrocketed to $112 billion at the beginning of 2015, up from less than $12 billion in 2003, and "No recent development has influenced firms' strategic and financial decision-making as profoundly as the surge in shareholder activism following the global financial crisis".[1] Along with a surge in popularity comes scrutiny from both the press and financial community regarding activists' assertion that they enhance shareholder value, increase stock price, and improve targets' corporate performance.[2] The main critique of activists is known as the "myopic-activists" claim: that activist hedge funds extract short-term gains from targets but leave companies worse off after they exit their investments. This contentious debate has given the academic community a new area to analyze, and many recent studies have looked at all aspects of activist hedge funds, including their returns, success in achieving their goals, targets' stock price returns, and targets' corporate performance.

As of the current time period, a review of the literature demonstrates that while activist interventions clearly improve stock price performance, there is not a well-defined consensus on whether activist investors improve the operations of their targets. One difficulty in assessing operational improvements at companies involves the time frame used in the analysis. Most studies look at one, or maybe two, years post activist intervention. This may partially be due to

[1] Zenner, Junek, Ventresca and Hunker (2015).
[2] Throughout this paper, I use the terms corporate performance and performance interchangeably. The terms refer to both operating and investment performance and are meant to reflect any improvements at target companies.

the nature of activist interventions, as hedge funds typically only hold positions up to two years (see Boyson and Mooradian (2007)). However, lasting operational effects are more important than short-term changes in assessing the viability of activist investors' assertion of improving companies and increasing shareholder value. One study from 2015 does look at more of the long-term effects of activist interventions from 1994 – 2007. The researchers use a five-year time horizon to examine the idea that activist investors act myopically and harm their targets' long-term prospects in search of short-term returns. The findings of this study refute the myopic-activists assertion, demonstrating that stock price outperformance lingers for three, four, and five years post-intervention (see Bebchuk, Brav and Jiang (2015)). These researchers analyze Tobin's Q and Return on Assets (ROA)[3] as proxies for operational efficiency, two metrics I will also use in this paper.

In essence, this paper extends and refines the aforementioned Bebchuk, Brav, and Jiang study from 2015, which discovers that activist targets exhibit statistically significant positive long-term performance in both Tobin's Q and ROA relative to non-activist targets (see Bebchuk, Brav and Jiang (2015)). While I also find that activist targets demonstrate improved levels of Tobin's Q up to three years post-intervention, I do not find a statistically significant difference in ROA between activist targets and the matched sample[4] in the years subsequent to an activist intervention. My study is not identical to the Bebchuk, Brav and Jiang (2015) study, however; it has a few differentiating factors which may explain the differing results. One difference is that the timeframe of my paper is extended from 2007 to 2011. The extra four years of interventions are important because most of the additional investments occurred after the Financial Crisis of

[3] Tobin's Q and ROA are italicized when referring directly to the variables in the analysis but are not italicized when referring to the metric in general.
[4] The matched sample is described and defined later in the paper.

2008. The post-crisis period has seen an unprecedented rise in activist hedge funds, so it is plausible that tactics, targets, returns, and long-term effects may have changed. This extension of the dataset allows me to capture any post-crisis differences in activist interventions and may affect the overall results of whether activist investors improve companies' long-term prospects. An important consequence of the extra four years of interventions is that data is analyzed on each activist intervention up to *three* years post-intervention, rather than the five years used in the 2015 study. While five years is admittedly "longer-term" than three years, three years is enough time to catch long-term corporate improvements, and results are unlikely to vary significantly.[5] I also address two questions not explored in the 2015 study by Bebchuk, Brav and Jiang:

- Are activist interventions from after the Financial Crisis (2009 Q3) different in their effect on long-term performance from those occurring in the pre-crisis years?
- Do activist interventions in the technology sector differ from interventions in all other industries in how they affect the long-term performance of targets?

The first question is interesting for many reasons. As mentioned earlier, there has been an explosion in assets under management for activist hedge funds since the Financial Crisis of 2008, leading to potential changes in targets, tactics, level of aggression, and most importantly, returns and results. Furthermore, North American merger and acquisition activity has experienced an explosion since 2009.[6] One explanation for the success of activist hedge funds is their ability to force targets into takeovers (see Greenwood and Schor (2009)), so a change in the overall mergers and acquisitions environment could lead to dramatically different outcomes for targets. Additionally, if a greater proportion of targets were acquired in more recent years, these targets

[5] The three-year time horizon is motivated also by the limits of timing; data collection for this begins in Fall 2015: full annual data available only through 2014.
[6] Institute for Mergers, Acquisitions, and Alliances.

would drop out of the dataset (their results would subsequently be reported as part of the acquirer), leading to another potential change in corporate results. In spite of these hypotheses, the results of this paper indicate that there is not a statistically significant difference in activist investors' success between the pre and post-crisis periods.

The second question concerns industry differences in activists' success in improving targets' performance. One piece of literature regarding this topic is a report by the law firm Latham & Watkins LLP in 2012. The firm reviews the activist campaigns of 33 hedge funds from 2005 – 2011 and discovers that technology firms are targeted disproportionately to other industries. Latham & Watkins LLP's explanation for the abnormally high number of technology targets is that technology companies have the following attractive features: (1) there is a large available pool of potential acquirers in the technology sector and adjacent industries, (2) the industry is volatile, and (3) technology companies have a tendency to accumulate cash. The Latham & Watkins LLP report, however, does not focus on the long-term outcome of the target companies. Perhaps activist hedge funds perform better in industries that are easier to understand, or in which they have substantial experience, rather than the newer and generally more complex technology sector. Technology investments also generally have higher risk but higher reward (more volatile), representing attractive investment opportunities for hedge funds (as opposed to more conservative investment vehicles like mutual funds and pension funds). Another interesting possibility is that the dynamic between activist hedge funds and the board of technology companies may be slightly different than the same relationship in other industries. Stereotypically, technology company executives and board directors tend to be younger and based out of California, where there is a different management culture. This difference could pose difficulties, or even potential vulnerabilities, in activist shareholders' battles with

management to change direction of the company. In addition, Information Technology[7] targets represent ~20% of the total interventions in my dataset, allowing for an opportunity to study these interventions and produce statistically significant results. The findings from this paper show that targets in the technology sector outperform their peers in Tobin's Q during the years following an activist intervention but underperform their peers in other sectors in ROA during the years following an activist intervention.

While many previous studies do not focus on activist interventions' long-term effects on targets, they do analyze other aspects of activist investors. Primarily, studies examine the effect of interventions by activist hedge funds on the short-term share price of their targets. Using 888 activist interventions from 2001 – 2005, one study finds a positive abnormal return of 5 – 7% upon announcement of an activist hedge fund intervention with no apparent reversal (see Brav, Jiang, Partnoy and Thomas (2008)). Another study using a smaller sample of 151 activist interventions from 2003 – 2005 shows that activist targets demonstrate an abnormal return of 10.2% during the announcement period (see Klein and Zur (2009)). My findings of increased levels of Tobin's Q in the year following an activist intervention also point to the existence of a positive abnormal announcement return. This positive abnormal return contrasts with the returns when other activist institutional investors, such as pension funds, intervene; activism *as a whole*[8] shows little evidence of improvement at target companies (see Gillan and Starks (2007)). This may be because the market expects positive operational improvements from activist *hedge funds* due to their expertise (see Brav, Jiang, Partnoy and Thomas (2008)). However, not every activist intervention generates the same level of abnormal returns; campaigns focused on a change in

[7] For the purposes of this analysis, Information Technology is used interchangeably with Technology, referring to Sector 45 in the Global Industry Classification Standard (Information Technology).
[8] Includes activist pension funds, mutual funds, and other pooled investment vehicles – activism is not confined solely to hedge funds.

business strategy and a sale of the target produce higher returns, as does hostile activism when compared to passive activism (see Brav, Jiang, Partnoy and Thomas (2008)). Another study's results mirror those of the aforementioned analysis, also finding that activist interventions result in large positive, abnormal returns during the announcement period (see Greenwood and Schor (2009)). However, the same study determines that these abnormal returns can largely be attributed to the ability of an activist hedge fund to force its targets into takeovers, as some activist hedge funds look for digestible targets and their portfolios tend to perform poorly during periods where market-wide interest in MERGERS AND ACQUISITIONS is limited (see Greenwood and Schor (2009)).

Another area of academic interest is the overall success of activist hedge funds relative to their peers. As is customary when any new investment strategy arises, academics study whether these novel activist investment strategies outperform more passive investment tactics. Evidence suggests that activist hedge funds are often successful in achieving their objectives (obtaining a board seat, increasing dividends, forcing an acquisition, etc.) as well as generating positive announcement period and long-term returns for their limited partners (see Klein and Zur (2009)). A more recent study using 2,600 targets from 2001 – 2013 also finds that activist hedge funds outperform their other hedge fund peers (see Boyson, Ma and Mooradian (2015)). This outperformance is explained by the ability of activists to increase their aggression and target industry diversity as they gain experience, thus improving their success rate (see Boyson, Ma and Mooradian (2015)). Other studies discern that aggression in activists' demands, such as pushing for more board seats or more radical changes in the business, is an important trait for achieving success. A study using 418 activist events from 1994 – 2005 shows that aggressive activist hedge funds outperform their peers by 7 – 11% (see Boyson and Mooradian (2007)). The same study

also discovers that the most dramatic improvements in targets occur when activists seek corporate governance changes and reductions in excess cash (see Boyson and Mooradian (2007)). These findings are confirmed by an earlier study showing that hostile activism generates higher returns than non-hostile activism (see Brav, Jiang, Partnoy and Thomas (2008)).

Activist investors' agitation of company management also provokes a legal argument regarding corporate governance and the balance of power between outside shareholders and company management. Some of the tactics of activist investors are hostile, evoking memories of corporate raiders in the 1980s and eliciting public support for the "victimized" companies. There have been several high profile battles between corporations and activist investors, most famously DuPont Chemical's battle against Nelson Peltz and his activist hedge fund Trian Fund Management, which DuPont eventually won. The main legal argument against acquiescing to activist investors is the influential view in corporate law that undue pressure from shareholders causes companies to make myopic decisions, sacrificing long-term growth for hitting short-term earnings targets or dividend payouts (see Bebchuk (2013)). However, board-insulating tactics impose some of their own long-term costs and are associated with lower operating performance and firm value (see Bebchuk (2013)). This debate is particularly relevant in the U.S. where shareholders wield considerable influence. As a counterexample, the German corporate governance system has traditionally been universally bank-dominant, as the German government attempts to limit shareholders' powers (see Bessler, Drobetz and Holler (2015)). Therefore, this paper's analysis of exclusively North American activist interventions reflects not only the tactics of activist hedge funds but also the infrastructure and government policy under which American hedge funds and corporations operate.

Perhaps the most important debate regarding activist investors, and the question I attempt to answer, is whether they achieve what they promise, increasing shareholder value, or, conversely, succumb to the myopic-activists critique. This dispute has received attention from politicians, as "Presidential candidate Hillary Clinton has pledged tax reforms targeting "hit-and-run" activists, though she also says some activists help hold managers accountable".[9] The ambivalence on the topic is shared by one of the most prominent activist investors ever, Carl Icahn of *Icahn Enterprises*, who recently said, "We definitely do not believe that all activism today is a good or a catchall".[10]

To successfully determine whether activist hedge funds enhance shareholder value, I must find a way to effectively measure shareholder value. By definition, shareholder value increases if the present value of all future cash flows grows due to the activist investors' intervention. Corporate performance is generally used as a proxy for future cash flows because companies with better corporate performance produce higher future cash flows, on average. However, it is not always easy to tell whether an activist intervention helps or hurts a company just based on one or two metrics. An example of this difficulty is exemplified by a study from *The Wall Street Journal* in 2015, which looks at activist targets with market capitalization greater than $5 billion[11] and concludes that targets slightly underperform industry peers in terms of earnings growth but enjoy higher profit margins.[12] These results demonstrate that activist interventions can affect different measures of performance in completely opposite manners. My analysis also encounters this discrepancy, as I find that the Tobin's Q of targets improves in the

[9] Benoit and Monga (2015).
[10] Benoit and Monga (2015).
[11] All of the activist interventions occurred after 2009.
[12] Benoit and Monga (2015).

years following an activist intervention while there is not a statistically significant change in ROA of the targets.

The evidence on whether activist hedge funds improve targets is mixed, leading to a contentious debate on the utility of these hedge funds. One study from 2006 finds that activist targets demonstrate modest improvements, with higher Return on Equity and Return on Assets one year after an activist intervention (see Brav, Jiang, Partnoy and Thomas (2008)). Alternatively, another study from a similar time period reaches the conclusion that activism does little to improve the long-term performance of the targets (see Gillan and Starks (2007)). One other study from 2008 emphasizes the mechanism through which improvements occur (or do not occur). This study uses a dataset with interventions from 1998 – 2005 and concludes that firms targeted for active ownership exhibit higher Return on Assets in addition to positive abnormal stock performance. However, the findings show that corporate improvements are driven by the divestiture of underperforming assets (see Clifford (2008)) rather than the ability of activist hedge funds to force targets into takeovers (see Greenwood and Schor (2009)).

While my analysis primarily focuses on the long-term performance of activist targets, I also investigate the effect that pre and post-crisis periods have on activist interventions, as well as whether the success of activist interventions changes in the technology sector vs. other sectors. I find that the empirical evidence refutes the myopic-activists claim; my dataset shows sustained increases in Tobin's Q for activist targets up to three years post-intervention. While I find no differences in activist campaigns in the pre and post-crisis periods, my results show that technology targets demonstrate increased ROA and decreased Tobin's Q relative to targets in other sectors. My analysis is organized as follows. Part II describes the data collection process and introduces my proxies for corporate performance. It also outlines the control variables and

interaction terms in my regression models. Lastly, it describes the target dataset. Part III covers the results of my regression models. It outlines my empirical approach, describes the statistically significant findings of the regression models, and presents the results of my estimated F-Tests. Part IV discusses the implications of my findings and analyzes the statistical process. I provide my conclusions in Part V.

II. DATA

A. Data Collection

Wharton Research Data Services is the main data source for my analysis, specifically the Compustat and Center for Research in Security Prices (CRSP) databases. Compustat provides quarterly financial and statistical data for companies since 1962, based on public filings. CRSP is one of the largest and most comprehensive stock market information databases, with daily stock prices, dividends, and shares outstanding data for companies listed on the NYSE, AMEX, and NASDAQ. My data collection process starts when Arthur F. Burns Professor of Free and Competitive Enterprise at Columbia Wei Jiang, who has done extensive research into activist hedge funds, provides an initial list of specific targets of an activist intervention from 1994 – 2011. I then use the merged Compustat and CRSP database[13] to gather financial and market data for these companies.

I remove observations with a negative book value of equity, which may occur for companies in distress, because ratios like *Tobin's Q*,[14] with book value of equity in the denominator, are difficult to interpret when book value of equity is negative.[15] Additionally,

[13] I refer to this database as the Compustat / CRSP database throughout the rest of this paper.
[14] Variable names are italicized throughout the paper.
[15] Variable calculations and definitions are provided in the Data Appendix at the end of the paper.

while Wei Jiang's initial list of interventions goes back to 1994, my dataset includes companies targeted in 1995 Q3 and after.

The final sample of activist targets consists of 896 total companies. 23% of these are from the Consumer Discretionary sector and 20% are Information Technology companies. Between 13-14% of the targets come from the Financials, Health Care, or Industrials sectors. The rest of the industries individually represent less than 5% of the target dataset. 12.7% of the 896 activist interventions occur in quarters after 2009 Q3, allowing me to analyze the difference in activist success in the periods before and after the Financial Crisis of 2008. The activist interventions take place pretty evenly throughout all the years in the dataset, with 2005 and 2007 being the lone exceptions; 10.4% of the interventions happen in 2005 while over 12% of the activist interventions occur in 2007.

I create a matched sample to compare the activist targets to companies not held in activist investors' portfolios. This sample consists of all companies in the Compustat / CRSP database from 1995 Q3 – 2014. This dataset contains about 500,000 observations, but after screening for duplicates, observations where the book value of equity was negative, and winsorizing the combined sample at the 5% and 95% levels for ROA and Tobin's Q, the remaining dataset consists of 382,200 quarterly observations. The combined dataset represents 13,499 distinct companies, of which 896 companies and 49,186 total quarterly observations characterize activist targets. Consistent with Bebchuk, Brav, and Jiang (2015), I account for the effect of outliers by winsorizing the data at the 5% and 95% levels of both *Annual Return on Assets (Annual ROA)* and *Tobin's Q.*[16] Eliminating the lowest and highest 5% of values from the full dataset reduces the standard deviation of overall *Tobin's Q* and *Annual ROA* by almost 5x.

[16] Both variables are described and explained later in the data section.

B. Proxies for Corporate Performance: ROA and Tobin's Q

One main dependent variable I analyze as a proxy for corporate performance is *Annual ROA*. ROA is a commonly used metric in academic studies that shows how efficiently companies in different industries utilize their assets to generate profits (earnings power). Using *Annual ROA* as a proxy for performance is consistent with Clifford (2008), another study that measures the effects of activist interventions on target companies. One potential limitation of the way I calculate *Annual ROA* is that I use quarterly *Operating Income / Assets* and then annualize the value by multiplying by 4 rather than using last 12 months data.[17] Quarterly observations may be more volatile than annual numbers due to accounting decisions and the effect of one-time, non-recurring events. Consequently, this introduces a potential source of noise into my analysis, but the use of quarterly data is motivated by an attempt to isolate the exact quarter of an activist intervention.

Tobin's Q is the other proxy for performance used in this analysis. It is a market-based metric and is generally utilized by financial economists to measure firms' effectiveness. The inclusion of *Tobin's Q* is consistent with studies such as Bebchuk, Brav and Jiang (2015) that also assess the performance of activist targets. It is designed to measure how well firms turn a given book value of assets into market value for investors. Alternatively, it measures how the market values companies' assets, with a higher valuation signifying higher perceived corporate effectiveness. Because activist interventions can improve company's operations in ways other than increasing the earnings ability of existing assets, *Tobin's Q* is a more comprehensive metric than *Annual ROA* for an analysis designed to capture corporate improvements.[18]

[17] The rationale behind isolating quarterly observations is that activists sometimes invest in targets based on a poor quarter or couple of quarters, suggesting that more granular timing may capture activists' decision-making more accurately.
[18] The calculation of *Tobin's Q* is described in the Data Appendix section.

The calculation for *Tobin's Q* involves making sure the timing of market value and book value of equity is correct. The academic convention for calculating *Tobin's Q* is as follows: for 2013 Q1 and 2013 Q2 book value of equity, use the book value of equity at Year End 2011. For 2013 Q3 and 2014 Q4, use the book value of equity at Year End 2012. Regarding market value, use the metric from the relevant quarter (for 2013 Q1 market value, use the market value at the end of 2013 Q1). In this way, the market values correspond to the latest publicly available information on shareholders' equity, as companies often file their reports with the Securities and Exchange Commission a few months after the relevant fiscal quarter ends.

Further modification of *Tobin's Q* and *Annual ROA* is needed to provide a more accurate avenue for comparison across companies and industries. Due to the diverse nature of different industries, I compare activist targets' *Annual ROA* and *Tobin's Q* values to their respective industry averages. For example, Information Technology and Healthcare companies have much higher average values of *Tobin's Q* (over 6.4) than Utilities companies (under 1.7). Similarly, the Healthcare sector has an average *Annual ROA* of -18.48% while the energy sector averages 12.36% in *Annual ROA*. Therefore, in a manner consistent with Bebchuk, Brav and Jiang (2015), I calculate the industry average values for both *Tobin's Q* and *Annual ROA*. I then generate two new variables, *Industry Adjusted Tobin's Q* and *Industry Adjusted Annual ROA*, which represent those observations' *Tobin's Q* or *Annual ROA* minus the industry average.

C. Control Variables for Regression Analysis

Target is an indicator variable with a value of 1 if the quarterly observation represents an activist intervention that occurs in *that specific quarter*. *Has Been Targeted* is another indicator variable that has a value of 1 if that specific company had ever been the target of an activist intervention, regardless of when the intervention occurred. *Target* helps analyze the statistics of

the companies that activist investors target, while *Has Been Targeted* keeps track of activist targets throughout time.

There are other aspects of a company that affect its performance apart from whether or not it is an activist target. Perhaps one of the most important of these variables is the industry in which a company belongs.[19] After determining the industry classification of each company, I produce an indicator variable *Information Technology*, which has a value of 1 if the GICS industry code corresponds to the Information Technology sector. This indicator variable allows me to test whether activist hedge funds have more or less success in improving technology targets' long-term operations. I also generate indicator variables for all the other sectors to use as fixed effects in my regression model. This is consistent with Bebchuk, Brav and Jiang (2015), as industry fixed effects are likely to have an effect on both *Annual ROA* and *Tobin's Q* due to the differences in operating structure and market perception of the industries.

The estimated regression models include *Yearly Fixed Effects* along with *Industry Fixed Effects*. *Yearly Fixed Effects* help control for time trends in *Tobin's Q* and also account for macroeconomic impacts on both *Tobin's Q* and *Annual ROA* (see Bebchuk, Brav and Jiang (2015)). *Industry Fixed Effects* account for the differences in *Tobin's Q* and *Annual ROA* across industries. *Market Value of Equity* and *Age* are incorporated as well to control for the effects of size and age on *Tobin's Q* and *Annual ROA*. Klepper (1996) suggests that firms, especially high-technology companies, lose their innovative edge as they age and market shares stabilize. Other studies, such as Agarwal and Gort (2002) also examine the effect of age on operating performance. Consistent with Bebchuk, Brav and Jiang (2015), I transform both *Market Value of Equity* and *Age* into natural logarithms to normalize their distribution. Additionally, targets that

[19] Industry classification is based on the Global Industry Classification Standard codes provided by Compustat.

were invested in after 2009 Q3, the first quarter in which American GDP growth turned positive after the Financial Crisis, have a value of 1 in the indicator variable *Pre Post-Crisis*.

Lastly, I generate indicator variables *Event Year, T+1, T+2,* and *T+3* with a value of 1 if that particular company was targeted by an activist within the previous year, one year ago, two years ago, or three years ago, respectively. These indicator variables are critical in analyzing the effect of activist interventions on company operating performance *over time*. I also create *Pre-Event Dummies*: indicator variables with a value of 1 if an activist intervention occurs in the next year, two years, or three years. The reason these dummies are included in the regression models is to account for reversion to the mean. Generally, activist investors target companies that are not performing well or are vulnerable (see Brecailo (2008)). Therefore, activists tend to invest in companies with poor performance in the years prior to the intervention. Reversion to the mean predicts that these companies are likely to improve corporate performance. Consequently, including *Pre-Event Dummies* controls for the phenomenon that companies are likely to revert to the mean and improve in the years following poor performance and thus helps isolate the effect of activist interventions.

While I do have variables like *Leverage* and *Capital Expenditures* for the targets in the dataset, I remove these variables from the regression because they are functions of management decisions[20] (see Bebchuk, Brav and Jiang (2015)).

D. Interaction Terms

I generate interaction variables between *Pre Post-Crisis* and the indicator variables for the event year and subsequent three years (*Event Year, T+1, T+2,* and *T+3*) to observe whether activist interventions have more success in improving the long-term performance of targets in the

[20] Since they are functions of management decisions, which are affected by activist shareholders, keeping their values constant while analyzing the effect of activist interventions does not accurately model the real world.

post-Financial Crisis period. Similarly, I hypothesize that there might be differences in the ability of activist investors to enact corporate performance improvements at technology companies versus other industries. As a result, I create interaction variables between *Information Technology* and the indicator variables for the event year and subsequent three years (*Technology Event Year*, *Technology T+1*, *Technology T+2*, and *Technology T+3*).

E. Description of the Target Dataset

Because the target dataset has a few firms that are extremely large in size, these few companies can heavily influence any value-weighted metrics or variables that I calculate.[21] The median *Market Value of Equity* of the targets is around $587 million, with median annualized *Revenue* of around $230 million.[22] *Tobin's Q* is right skewed, as the mean is 66% higher than the median. The average *Age* of the targets is 10.20 years. Interestingly, the targets tend to underperform their respective industries when looking at *Tobin's Q* (mean of -1.77, median of -2.00) yet the average *Industry Adjusted Annual ROA* is positive 0.09 with a median of 0.07.[23] Perhaps this is due to activists targeting companies with sound underlying operations but low market valuations due to poor management, a depressed industry, significant room for dividends / share buybacks, etc. The findings of previous literature reinforce this claim. Activist hedge funds generally target companies with lower payout ratios than normal (see Brav, Jiang, Partnoy and Thomas (2008)), as well as companies that are undervalued and have strong operating

[21] I do not include any value-weighted metrics in my analysis, so the presence of these firms does not present a problem.
[22] All figures, including summary statistics, are provided at the end of the paper in the Figures section.
[23] This pattern is further explored statistically in the regression analysis.

performance (see Boyson and Mooradian (2007)). The evidence from this dataset is consistent with findings from previous studies.

Average values for *Tobin's Q* and *Annual ROA* vary substantially by industry. Targets in the Health Care industry have the highest *Tobin's Q* at the time of intervention, averaging 5.35. Financials targets, on the other hand, exhibit an average *Tobin's Q* of only 1.36. There is an even greater discrepancy in targets' *Annual ROA*, as Utilities targets have an average annual ROA of 11.12% while Consumer Staples targets average an annual ROA of -0.14%. On an industry-adjusted basis, Information Technology companies are the worst performing targets at the time of activist intervention in terms of *Tobin's Q*, with an average *Industry Adjusted Tobin's Q* of -4.1. Interestingly, however, Information Technology targets demonstrate the highest *Industry Adjusted Annual ROA*, with an average of 18.44%. None of the target sectors demonstrate positive average *Industry Adjusted Tobin's Q* values, while all the sectors except Consumer Staples and Energy show positive averages for *Industry Adjusted Annual ROA*. This dichotomy indicates that activist investors choose undervalued companies with strong operating performance and long-term potential, consistent with activist funds' stated strategies.

There is substantial variation in *Industry Adjusted Tobin's Q* across the timeframe analyzed. In 1996, activist targets show a positive *Industry Adjusted Tobin's Q*, whereas in 2002 and 2008 the targets have an average *Industry Adjusted Tobin's Q* of around -3.[24] This distribution is likely due to macroeconomic factors, such as high growth rates in the U.S. in the middle 1990s.[25] Additionally, in 2002, the market was recovering from the dot-com bubble, and 2008 brought the devastating effects of the Financial Crisis, pushing the country into a

[24] See Table I, Panel C for exact numbers and a complete breakdown by year.
[25] U.S. Bureau of Economic Analysis.

recession.[26] *Annual ROA* is less volatile across time, demonstrating the predictability of asset efficiency relative to market valuation. However, in 1997, *Annual ROA* for targets averaged 15.55%, substantially above the overall average of 7.7%; this may be partly because the economy did incredibly well in 1997, expanding GDP by 4.5% vs. the prior year.[27]

III. RESULTS

A. Empirical Approach

Model 1 utilizes *Industry Adjusted Tobin's Q* as the dependent variable and includes yearly and company fixed effects, both of which increase the R^2 of the model. Model 1 also includes indicator variables for each of three years prior to an activist intervention (*Pre Event Dummies*). Indicator variables for the intervention year (*Event Year*) and the subsequent three years (*T+1*, *T+2*, *T+3*) are the main variables of interest in Model 1. Model 2 is identical to Model 1 but uses industry fixed effects in place of company fixed effects. Models 3 and 4 introduce the interaction effect between *Pre Post-Crisis* and the indicator variables for the intervention year and three subsequent years (*Crisis Event Year*, *Crisis T+1*, *Crisis T+2*, and *Crisis T+3)*; Model 3 makes use of company fixed effects while Model 4 includes industry fixed effects instead.

Models 5 and 6 analyze the interaction effect between *Information Technology* and the indicator variables for the interaction and three subsequent years (*Technology Event Year*, *Technology T+1*, *Technology T+2*, and *Technology T+3*); Model 5 uses company fixed effects

[26] U.S. Bureau of Economic Analysis.
[27] U.S. Bureau of Economic Analysis.

whereas Model 6 incorporates industry fixed effects. Models 7 – 12 have exactly the same independent variables as Models 1 – 6 but use *Industry Adjusted Annual ROA* rather than *Industry Adjusted Tobin's Q* as the dependent variable of interest.

Because my data is a typical finance panel dataset, it is important that I cluster the standard errors by company to enhance the statistical reliability of my results. The assumption of any OLS multiple regression is that the dependent variable observations are independent of each other; it is presumed that the error terms (ε) in the following model: $y = \alpha x + \beta y + \ldots. + \varepsilon$ are independent. However, in a typical finance panel dataset containing observations on multiple firms and time periods, the regression residuals are unlikely to be uncorrelated across firms (see Thompson (2011)). Since *Tobin's Q* has a market return embedded within it,[28] I cluster the standard errors by company to account for the fact that market-wide shocks will produce correlation between firms at specific points in time (see Thompson (2011)). A check for robustness is consistent with the methodologies of previous studies (see Bebchuk, Brav and Jiang (2015) and Boyson and Mooradian (2007)). The 12 models generate some results consistent with previous literature and others that differ slightly, offering important implications for policy and corporate governance regarding activist hedge funds.

B. Tobin's Q Multiple Regression Results: Models 1 and 2

The results from Model 1 demonstrate several important points regarding the impact of activist interventions on target companies' *Industry Adjusted Tobin's Q*. The coefficients on the pre-intervention indicator variables, and on *Event Year*, are negative and statistically significant at the 1% level, suggesting that activist investors target companies undervalued relative to their competitors prior to, and at the time of, intervention. These results are consistent with earlier

[28] *Market Value of Equity* is in the numerator – see the Data Appendix section for the full formula.

findings from Boyson and Mooradian (2007) and Brecailo (2008). What is interesting about the post-intervention indicator variables is that the coefficient on *T+2* is negative and statistically significant at the 1% level while the coefficients on *T+1* and *T+3* are not statistically significant. This means that activist targets are still undervalued relative to their industry peers two years after the intervention. However, as will be discussed in the F-Tests section, activist investors do demonstrate an ability to improve the *Industry Adjusted Tobin's Q* of their targets relative to the intervention year and year prior to intervention.

Model 2 is identical to Model 1 except it includes industry fixed effects rather than company fixed effects, and it generates similar results to Model 1. The only difference is that the coefficients on the post-intervention dummies are negative and statistically significant in Model 2 (they are negative in Model 1 but not statistically significant except for *T+2*). The negative value and statistical significance of these coefficients signify that activist targets still underperform their peers in terms of *Industry Adjusted Tobin's Q* in the three years post-intervention. However, the coefficients become less negative in the three years post-intervention, and this decrease in absolute value is statistically significant,[29] demonstrating that targets' *Industry Adjusted Tobin's Q* values improve after intervention.

C. Annual ROA Multiple Regression Results: Models 7 and 8

Model 7 analyzes *Industry Adjusted Annual ROA* as the dependent variable and uses company fixed effects. It generates a few findings that are inconsistent with Bebchuk, Brav and Jiang (2015) but mirror the conclusions of certain other studies. All of the coefficients on the pre and post-intervention dummies are positive, and all of them except *T-2* are statistically significant at the 5% level. While the *Pre-Event Dummies* are not the primary variables of

[29] The difference between each year's coefficients is shown to be statistically significant in the F-Tests section.

interest, these positive, statistically significant results indicate that activist investors target companies with strong fundamental performance *before intervention* as measured by *Industry Adjusted Annual ROA.* This is consistent with the results of Boyson and Mooradian (2007), who also show that target companies are usually small, undervalued and have *strong operating performance.*[30] The fact that targets produce above average *Industry Adjusted Annual ROA* and continue to do so post-intervention suggests that they are undervalued for reasons other than an underperformance in asset efficiency.

Despite the positive and statistically significant coefficients on *T+1, T+2,* and *T+3,* activist investors *do not* necessarily improve the ROA of their targets. Rather, the companies they target outperform their peers before an intervention, and they continue to do so in the subsequent years. Furthermore, the coefficients on *T+1, T+2, T+3* are not increasing, showing that activist investors *do not* necessarily improve the *Industry Adjusted Annual ROA* of their targets, an assertion that is proven in the F-Tests section.

Model 8 uses industry fixed effects rather than company fixed effects and produces similar results to Model 7 except that the coefficients on all of the pre and post-intervention indicator variables are positive and statistically significant at the 1% level. This persistent positive performance indicates that activist targets perform well both before and after intervention.

D. Introducing the Crisis Interaction Effects for Tobin's Q and Annual ROA: Models 3, 4, 9 and 10

Models 3 and 4 extend the *Industry Adjusted Tobin's Q* analysis conducted in Models 1 and 2 by introducing an interaction effect between *Pre Post-Crisis* and the target year indicator variables (*Crisis Event Year, Crisis T+1, Crisis T+2,* and *Crisis T+3*). The idea behind this

[30] Boyson and Mooradian (2011) use ROA as their proxy for corporate performance.

interaction is that activist hedge funds may be more successful in improving the operating performance of their targets in the period after 2009 Q3 than in the period before 2009 Q3. However, none of the coefficients on any of the interaction terms are statistically significant. This indicates that companies targeted in the post-crisis period do not display statistically significantly different *Industry Adjusted Tobin's Q* values from those of pre-crisis targets. Furthermore, activist investors do not have statistically different levels of success in improving companies' *Industry Adjusted Tobin's Q* in the three years subsequent to the intervention.

Models 9 and 10 are identical to Models 3 and 4 but analyze *Industry Adjusted Annual ROA* rather than *Industry Adjusted Tobin's Q* as the dependent variable. They produce results similar to Models 3 and 4, as most of the crisis interaction terms do not have statistically significant coefficients. The exceptions are *Crisis T+1* in Model 9, which is negative and statistically significant at the 5% level, and *Crisis T+3* in Model 10, which is positive and statistically significant at the 10% level. In spite of these two variables demonstrating statistical significance,[31] there is no overall pattern in the interaction terms or sustained statistical significance. Therefore, there is no meaningful difference in activist investors' ability to change ROA in their targets between the pre and post-crisis periods.

This conclusion mirrors the takeaway from Models 3 and 4; there is not a statistically significant difference in activist investors success in *improving companies' long-term operations and market valuation* between the periods before and after 2009 Q3. While activist hedge funds' assets under management and popularity have increased, my findings do not show any difference

[31] 5% is generally considered statistically significant, but I also note results that are significant at the 10% level to be consistent with Bebchuk, Brav and Jiang (2015).

in their ability to enact *lasting* operational and valuation changes at their targets between the pre and post-crisis periods.[32]

E. Introducing the Technology Interaction Effects for Tobin's Q: Models 5 and 6

Models 5 and 6 use *Industry Adjusted Tobin's Q* as the dependent variable and introduce interaction terms between *Information Technology* and *Event Year*, *T+1*, *T+2*, and *T+3*. When introducing these interaction terms, the coefficients on the pre-intervention indicator variables as well as the post-intervention indicator variables except for *T+3* are negative and statistically significant at the 1% level, similar to Model 2. The only difference between Models 5 and 6 is that the coefficient on *T+3* is not statistically significant in Model 5, but it is statistically significant in Model 6. Of the four interaction terms introduced, the only ones that are statistically significant are *Technology Event Year* and *Technology T+3*. The coefficient on *Technology Event Year* is negative and statistically significant at the 1% level, indicating that firms that are targeted by activists *and* in the Information Technology sector have substantially lower *Industry Adjusted Tobin's Q* values than other similar targets.[33] Activist investors generally target undervalued companies, and this finding may help explain why over 20% of the targets in this dataset are Information Technology companies. Activist investors are generally attracted to undervalued companies (see Boyson and Mooradian (2007)), and perhaps the complexity involved in the Information Technology industry presents more opportunities for activist hedge funds to correct a market mispricing. The coefficient on *Technology T+3* is also negative and statistically significant at the 5% level. This finding suggests that technology

[32] The cutoff of 2009 Q3 may explain part of the lack of statistical significance, as the market conditions I hypothesize may affect activist interventions could arise before or after this cutoff.
[33] Similar targets refer to targets with the same values for the control variables.

companies demonstrate lower values of *Industry Adjusted Tobin's Q* than similar targets in other sectors three years after an activist intervention.

Model 6, which uses industry fixed effects rather than company fixed effects, generates similar results to Model 5 except that the coefficients on *Technology T+2* and *Technology T+3* are both negative and statistically significant at the 5% level in Model 6. These coefficients imply that targets in the technology sector have *Industry Adjusted Tobin's Q* values 1.68 units lower than similar targets in other sectors two years post-intervention and 2.71 units below similar targets in other sectors three years post-intervention. This indicates that the long-term *Industry Adjusted Tobin's Q* of targets in the technology sector is lower than for similar targets in other sectors.

Nevertheless, the coefficients on *Technology T+1*, *Technology T+2*, and *Technology T+3* are neither increasing nor decreasing uniformly, indicating that performance does not get consistently better or worse over time in the technology sector. The primary significant difference between technology and non-technology targets demonstrated in the findings of Models 5 and 6 is that technology targets are more undervalued at the time of intervention than similar targets in other sectors. This may be due to the nature of the technology sector, as the technology sector averaged 25.3% annualized volatility from 1989 – 2014, the highest of any industry.[34] A sector with high volatility has the potential for more extreme equity mispricing and opportunities for activists to take positions in targets. Additionally, the complex nature of technology companies and lack of understanding of companies' business models by the market can also lead to enhanced undervaluation.

F. Introducing the Technology Interaction Effects for Annual ROA: Models 11 and 12

[34] *Pension Partners* – Bilello (2014).

Model 11, which uses company fixed effects, introduces the *Information Technology* interaction effect using *Industry Adjusted Annual ROA* as the dependent variable. Similar to Model 7, the results of Model 11 show that activists invest in targets with strong operating fundamentals, as five out of the seven pre and post-intervention indicator variables have coefficients that are positive and statistically significant at the 5% level. None of the coefficients on the interaction terms are statistically significant at the 5% level.

Model 12, on the other hand, uses industry fixed effects and produces substantially different results from Model 11. The coefficients on the interaction terms are all positive and statistically significant at the 1% level. Consequently, in every year post-intervention, including the intervention year, targets in the technology sector have higher levels of *Industry Adjusted Annual ROA* than targets in other sectors. Accordingly, activist investors have more success improving the long-term asset efficiency of technology companies than companies in other sectors, as technology targets have higher *Industry Adjusted Annual ROA* than their non-technology counterparts. This contrasts with the results of Model 6, which show that technology companies demonstrate statistically significantly lower *Industry Adjusted Tobin's Q* values in the second and third years post-intervention than similar targets in other industries.

This contradiction can be explained by the differences in what *Tobin's Q* and *Annual ROA* represent. *Tobin's Q* is market-based, which means that perhaps technology companies struggle in the second and third years post-intervention due to factors not related to *Annual ROA*, such as excessive leverage or ill-advised acquisitions proposed by activist shareholders. These struggles may affect their market valuation even if their underlying operations are still sound. *Annual ROA* simply measures how efficiently companies use their assets to generate profits, whereas *Tobin's Q* encompasses more aspects of the company because it is market-based. Thus,

activist investors do a better job improving the long-term operations of technology companies from an asset efficiency perspective, but the market valuation may not always reflect these improvements, especially a few years after an intervention. As the F-Tests illustrate (discussed in the next section), the target dataset as a whole demonstrates an improvement in *Industry Adjusted Tobin's Q* and indeterminate results for *Industry Adjusted Annual ROA* after an activist intervention. Because the technology interaction produces the opposite results, activist interventions in the technology sector may lead to different outcomes than in other sectors, providing a note of caution for activist investors interested in the technology industry.

G. F-Tests: Analyzing the Evolution of Tobin's Q and ROA Over Time

The myopic-activists claim, in which critics argue that activist investors extract short-term gains from their targets in exchange for a deterioration in long-term corporate performance, is examined by estimating a series of F-Tests. The F-Tests compare the difference in coefficients between post-intervention year dummies and *Event Year* or *T-1*; the tests are the basis for determining how the performance of activist targets evolves over time.

H. Industry Adjusted Annual ROA F-Tests: No Statistically Significant Results

For the two regression models using *Industry Adjusted Annual ROA* as a dependent variable,[35] six F-Tests are estimated for the difference between the coefficients on post-intervention dummies and the coefficient on *Event Year*, while six F-Tests are estimated for the difference between the coefficients on post-intervention dummies and the coefficient on *T-1*. None of the differences between the coefficients for years subsequent to the intervention year and either *Event Year* or *T-1* are statistically significant, indicating that activist investors do not statistically significantly improve companies' *Industry Adjusted Annual ROA* in the years

[35] Not including the models with interaction terms.

subsequent to their intervention relative to either the intervention year or the year prior to the intervention year. This finding contradicts activists' claim that they improve the operations of their target companies. It is necessary to note, though, that there are other avenues through which activist investors can improve performance. For example, hedge fund targets often significantly increase dividends, leverage, and decrease cash holdings (see Klein and Zur (2009)), all effects that would not necessarily improve ROA. As is demonstrated by the *Tobin's Q* F-Tests findings, activist hedge funds do, in fact, improve the performance of their targets via increases in *Industry Adjusted Tobin's Q*.

I. Industry Adjusted Tobin's Q F-Tests: Activist Investors Improve the Tobin's Q of Targets in the Three Years Post-Intervention

I then estimate 12 F-Tests on the same coefficient differences in the *Industry Adjusted Tobin's Q* models. These tests find positive and statistically significant differences between the coefficients on post-intervention dummies and the coefficients on *Event Year* and *T-1*. This suggests that activist targets have higher average *Industry Adjusted Tobin's Q* values in subsequent years to the intervention than the matched sample.[36] The existence of a substantial announcement period return, which is the general positive stock market reaction to an activist investor taking a stake in a target, can help explain the positive differences between the coefficients on *T+1* and *T-1* and *T+1* and *Event Year*. Brav, Jiang, Partnoy and Thomas (2008) measure this abnormal return at 5 – 7%, while Klein and Zur (2009) detect a 10.2% average abnormal return during announcement period and an 11.4% abnormal return in the subsequent year. However, announcement period returns cannot explain the positive *long-term* effects on

[36] Referring to companies not targeted by activist investors.

Industry Adjusted Tobin's Q that activist investors have on their targets, which are uncovered by the F-Test results involving the coefficients on *T+2* and *T+3*.

In the 12 *Tobin's Q* F-Tests (six using coefficients from Model 1, six using coefficients from Model 2) that compare the coefficients on the post-intervention dummies to *T-1* and *Event Year*, a clear pattern emerges; substantially all of the differences are positive and statistically significant. Every difference is positive and statistically significant at the 5% level except for *T+1 vs. Event Year*, which is likely due to the immediate improvement[37] in *Tobin's Q* upon intervention that shows up in *Event Year* results. The overall statistical significance is consistent with the findings of Bebchuk, Brav and Jiang (2015). These results demonstrate that activist investors do improve the *Industry Adjusted Tobin's Q* of their targets post-intervention, persisting up to three years. Additionally, the differences in coefficients increase as time progresses; for both company and industry fixed effects, the differences in coefficients for *T+3 vs. T-1* and *T+3 vs. Event Year* are greater than *T+1 vs. T-1* and *T+1 vs. Event Year*, respectively. These findings are also consistent with Bebchuk, Brav and Jiang (2015), who record similarly increasing differences in coefficients for up to five years post-intervention. Therefore, the myopic-activists claim of activist hedge funds extracting short-term returns from targets in exchange for deteriorating performance in subsequent years is not present in the empirical data. Rather, the targets' market valuation improves over time, illustrating the lasting impacts that activist investors make at their targets. This conclusion is consistent with previous literature such as Boyson and Mooradian (2007) and Goodwin, Singh, Slipetz and Rao (2014), which finds that activist investors generate substantial long-term value for target firms.

[37] Announcement period return.

The results of both the *Industry Adjusted Tobin's Q* and *Industry Adjusted Annual ROA* F-Tests demonstrate that while activist investors are able to increase corporate performance as measured by *Industry Adjusted Tobin's Q* over the long-term, they do not improve their targets' asset efficiency as measured by *Industry Adjusted Annual ROA.* Since *Tobin's Q* is market-based and the results show a sustained increase in *Industry Adjusted Tobin's Q* for activist targets, activist investors are able to improve market perception of their targets in the long run. However, this improved market perception occurs through mechanisms other than improvements in ROA. This ambiguous finding, while inconsistent with Bebchuk, Brav and Jiang (2015), is similar to findings from several other academic studies. Brav, Jiang, Partnoy and Thomas (2008) and Klein and Zur (2009) detect sustained long-term abnormal returns in activist targets. Additionally, Brav, Jiang, Partnoy and Thomas (2008) conclude that target firms see only moderate operational improvements in ROA. The existence of improvements in market valuation in the absence of measurable operational improvements in asset efficiency is consistent with certain literature and reflects the broad array of tactics and strategy that activists use in their investments.

Instead of asset-efficiency improvements, the enhanced long-term market valuation of targets may come about from several factors: (1) activist investors may change the business strategy of the company, (2) activist hedge funds often will push for the divestiture of underperforming assets (see Clifford (2008)) or force a target into a takeover (see Greenwood and Schor (2009)), or (3) activist hedge funds attempt to address cash flow agency costs (see Klein and Zur (2009)) and alter the leverage of targets in an effort to enhance equity returns.

IV. DISCUSSION AND FURTHER IMPLICATIONS

The findings from my analysis present five major conclusions regarding activist hedge funds:

(1) Overall, activist hedge funds improve the long-term *Industry Adjusted Tobin's Q* of their targets, but they do not improve the long-term *Industry Adjusted Annual ROA*.

(2) Activist hedge funds target undervalued companies with strong underlying operational performance[38] (technology companies are even more undervalued than similar companies in other sectors at the time of intervention).

(3) There is not a statistically significant different result in the long-term performance of activist targets in the periods before and after the Financial Crisis.

(4) Targets in the technology sector demonstrate increased *Industry Adjusted Annual ROA* relative to their peers in other sectors in the years following an activist intervention.

(5) Targets in the technology sector underperform their peers in other sectors in *Industry Adjusted Tobin's Q* during several of the years following an activist intervention.

The manner in which I collect data and conduct my statistical analysis requires further explanation in order to better understand my results. And in spite of the five clear conclusions, some findings lack an obvious interpretation, further contributing to the discussion and debate on the merits of activist hedge funds.

A. Analysis of the Efficacy of ROA and Tobin's Q as Proxies for Performance

The decision to use *ROA* and *Tobin's Q* as proxies for performance mirrors the methodology of Bebchuk, Brav and Jiang (2015), who use the same two proxies as dependent variables. ROA is by definition an asset-efficiency ratio, and Tobin's Q signifies how the market is valuing a given book value of assets, which is by extension the market's view on the current

[38] In this case, operational performance represents *Return on Assets*.

and future performance of the company. However, in my analysis, the estimated regression models for the two metrics produce different results for the two dependent variables. Therefore, it is important to understand exactly what the dependent variables represent. ROA is strictly a measure of asset efficiency and may not be the best proxy for overall performance in the context of activist investors and corporate governance. Activist hedge funds sometimes look to improve asset efficiency in their targets, but often times they also attempt to increase dividends and leverage and decrease cash (see Klein and Zur (2009)) or force targets into takeovers (see Greenwood and Schor (2009)). Therefore, improvements in a target company due to an activist intervention may not be easily observable when exclusively analyzing ROA.

On the other hand, Tobin's Q is sufficiently broad to capture multiple avenues of operational and financial improvements in activist targets because it is market-based. While many factors can drive short-term market valuation fluctuations, the sustained increases in *Industry Adjusted Tobin's Q* demonstrate that activist investors are able to improve their targets in a manner that drives market opinion higher without a corresponding drop a few years post-intervention. The findings from the *Tobin's Q* regression models reject the myopic-activist critique of activist hedge funds, as market valuation improvements at target companies persist up to three years after the initial intervention.

Despite its many merits as a representation of corporate performance, Tobin's Q is not a perfect proxy for performance, and its limitations can potentially affect the analysis and interpretation of Models 1 – 6. Since underinvestment increases rather than decreases Tobin's Q, Tobin's Q can sometimes be an ineffective measure of firm performance (see Dybvig and Warachka (2015)). Underinvestment should decrease the operating performance of a company, but due to the resulting accounting effects and formula for calculating Tobin's Q, it increases

Tobin's Q. This is a particularly relevant problem for studies involving activist hedge funds, as these funds often encourage returning capital to shareholders rather than reinvesting earnings in the company. While this limitation of Tobin's Q is valid, eventually underinvestment by target companies likely leads to deterioration in performance and thus share price and Tobin's Q. Therefore, because I track activist targets for up to three years post-intervention, I am able to satisfactorily mitigate this weakness in Tobin's Q.

B. Data Collection Analysis

The slight disparity in results between my analysis and those of Bebchuk, Brav and Jiang (2015) stems from several differences in our methods of data collection and thus final target dataset. I calculate ROA as EBIT / Total Assets, while Bebchuk, Brav and Jiang (2015) use EBITDA / Lagged Assets to get ROA.[39] Furthermore, my data segmentation is quarterly, while the Bebchuk, Brav and Jiang (2015) study uses annual data. The reasoning behind using quarterly data is to isolate the actual quarter a target is invested in rather than just the year. However, quarterly data is subject to more volatility and thus more granular data could introduce noise into the models; the low R^2 of my regressions may be partly because quarterly data has more noise and variability than annual data. Lastly, my dataset includes activist targets from 1995 Q3 through 2011, whereas the aforementioned study consists of interventions from 1994-2007. These extra years of data (2008-2011) may contribute to the differing results for the *Industry Adjusted Annual ROA* regression models, as the average *Annual ROA* of the targets is positive in every year between 2003 and 2007 but becomes negative in 2008 and 2009.

C. Attrition Due to Bankruptcy and Takeovers

[39] There are more missing observations for EBITDA than EBIT in my initial dataset, and ROA can be calculated using EBITDA / Assets, EBIT / Assets, or even Net Income / Assets.

One potential source of bias in my study is attrition, a particularly relevant issue when studying targets of activist investors. One prominent tactic of activist investors is forcing targets into takeovers (see Greenwood and Schor (2009)), in which case these companies then disappear from the dataset. Additionally, activists may take over struggling companies that subsequently go bankrupt, in which case they are also removed from the dataset. Both of these scenarios represent direct consequences of an activist intervention, and losing that data can be an important source of bias. This bias can be substantial; Bebchuk, Brav and Jiang (2015) find a target attrition rate of 49%, while my dataset experiences an attrition rate of 58%, as only 42% of the targets in my dataset remain at the end of 2014.

D. Stock Picking vs. Performance Improvements

The existence of persistent improvements in *Tobin's Q* for activist targets suggests that activist hedge funds utilize their expertise to generate lasting positive changes in their targets. However, a prominent critique of this idea is that activist actions during the course of their investment do not lead to improvements in their targets. Rather, some critics believe that activists are good stock pickers and the targets would improve regardless of an activist intervention.[40] The results from this paper do not definitively disprove this stock-picking argument. As discussed earlier, activist hedge funds target undervalued companies with sound operating performance and asset efficiency. A well-known tenant of value investing is that passively investing in solid companies currently underappreciated by the market generates satisfactory returns. In spite of this, even if the stock picking argument were correct, its existence would still refute the myopic-activists claim that activist interventions are inherently *negative* for companies, which is the main critique against activist hedge funds.

[40] *The Bebchuk Syllogism* – Lipton (2013).

Additionally, Bebchuk, Brav and Jiang (2015) address the argument that activists are merely good stock pickers and offer a rebuttal. They note that activist interventions involve significant costs, and activist investors are unlikely to undertake these fixed costs without a belief in their ability to improve company performance. If they believe in the targets' operations in the absence of any intervention, they would just buy a passive stake and reap the profits without incurring any costs. Furthermore, the findings of previous literature provides two important results: (1) hostile activism generates higher returns than non-hostile activism (see Brav, Jiang, Partnoy and Thomas (2008)) and (2) aggressive activist funds perform 7 –11% better than their peers (see Boyson and Mooradian (2007)). This empirical evidence counters the argument that activist hedge fund returns are due to stock picking ability; rather, the most aggressive funds are able to change the business strategy of current management, generating *higher* returns than would have occurred otherwise.

E. Interpreting the Technology Interaction Findings

Perhaps the most interesting findings in the paper are those involving the question of whether there are differences in activist success rates in the technology sector. While targets overall demonstrate an improvement in *Industry Adjusted Tobin's Q* and no significant change in *Industry Adjusted Annual ROA*, technology targets show a slight underperformance in *Industry Adjusted Tobin's Q* coupled with a sustained increase in *Industry Adjusted Annual ROA*. Activist hedge funds' inability to drive market valuation improvements in technology companies as successfully as they do in other sectors may be due to a multitude of factors: (1) a lack of understanding of the business, (2) an inability to force the market to understand the business, (3) more hostile and less successful relations with company boards, and (4) the cyclical nature of the technology industry. However, hedge funds' prowess in improving technology targets' *Industry*

Adjusted Annual ROA concurrently with market undervaluation is harder to explain. Most likely, the market focuses more on other aspects of the technology companies like leverage, growth, and competitive position than ROA in valuation. On average, technology companies are more growth-oriented than standard consumer or industrial companies, so the hypothesis that the market does not pay attention to ROA in its valuation of technology companies is plausible. This effect showing that changes in market valuation do not necessarily correspond with similar changes in ROA is analogous to the pattern observed in the overall target dataset, but with reverse effects for *Industry Adjusted Annual ROA* and *Industry Adjusted Tobin's Q*. *Annual ROA* is an incomplete proxy for company operating performance, while *Tobin's Q* encompasses more than just operational efficiency, making it a better proxy for firm value. Therefore, to the extent that *Tobin's Q* represents firm value, activist investors do a better job improving targets' long-term value in industries other than the technology sector, an important finding for activist hedge funds as well as corporate boards across all industries.

V. CONCLUSION

This paper investigates whether activist hedge funds improve the long-term performance of their targets. Additionally, I bifurcate the dataset into a period before 2009 Q3 and a period after 2009 Q3 to determine whether there are differences in the success of activist interventions before and after the Financial Crisis. I also examine whether there are differences in activist campaigns in the technology sector vs. all other sectors.

My dataset consists of 896 activist targets, ranging from 1995 – 2011. These targets are all North American companies, representing ten different industries. I create a matched sample of 12,603 non-target companies spanning the same time period so I can isolate the effect of activist interventions on company performance. Tobin's Q and ROA are the two proxies for

corporate performance used in this paper; I analyze both of these variables for activist targets for three years subsequent to their activist interventions. The findings of this analysis demonstrate that activist targets have successively higher levels of Tobin's Q in the three years post-intervention, suggesting that activist investors do have the ability to improve target companies' long-term performance. These results refute the myopic-activists critique, which hypothesizes that Tobin's Q and ROA levels would be substantially lower in the second or third years after an activist intervention. While this paper demonstrates that activist targets show improved Tobin's Q in the years after an activist intervention, the mechanism through which this improved market valuation occurs is *not* an increase in ROA.

To examine the questions regarding differences between pre and post-crisis periods and technology and non-technology targets, I introduce two sets of interaction effects. The first interaction effect tests for differences in the results of activist interventions between the pre 2009 Q3 period and the post 2009 Q3 period. The second effect analyzes the differences in the results of activist interventions for technology targets and non-technology targets.

I use two main statistical techniques to analyze my results; I estimate 12 total regression models along with 24 F-Tests on the differences between coefficients on the variables of interest. Before estimating any regressions, I check for robustness by clustering the standard errors of my data by company.[41]

The regression models and F-Tests produce several important results. First, activist hedge funds generally target undervalued companies with strong operating performance, a finding consistent with previous literature. Additionally, there is no evidence of the myopic-activists hypothesis in this dataset of targets, but results do indicate that activist hedge funds emphasize

[41] See Thompson (2011).

improvements in aspects other than ROA over the course of their investment in target companies.

The introduction of interaction effects into the regression models produces mixed results. There is no difference in activists' success in improving their targets' performance between the pre and post-crisis periods. However, activist targets in the technology sector show greater asset efficiency[42] in every year subsequent to the intervention but a lower market valuation[43] in a few years following the intervention relative to targets in other sectors.

The findings regarding differences in interventions in the technology sector and pre and post-crisis periods are interesting, but their real world application is mostly limited to activist hedge fund managers' target choices. The most relevant debate for politicians, academics, corporate managers, and financiers on this topic, and the main motivation for this paper, is whether activist interventions are damaging for companies in the long-term. The answer to this question has important implications regarding corporate governance and the relationship between shareholders and managers. This paper provides a resounding resolution to that question; activist interventions, on the whole, are actually *beneficial* for companies in the long-term. Consequently, policymakers and company executives should keep this in mind in their dealings with activist hedge funds.

[42] Refers to *Industry Adjusted Annual ROA*.
[43] Refers to *Industry Adjusted Tobin's Q*.

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VII. FIGURES

Table I: Descriptive Statistics

Table I Panel A provides summary statistics of 896 activist targets from 1995 – 2011. Panel B provides a breakdown of ***Tobin's Q***, ***Annual ROA***, ***Industry Adjusted Tobin's Q***, and ***Industry Adjusted Annual ROA*** for the ten different industries (defined by GICS Classification codes). Panel C further classifies the targets based on the year in which they were targeted, showing ***Industry Adjusted Tobin's Q*** and ***Industry Adjusted Annual ROA*** for every year from 1995 – 2011. ***Total Assets*** represents current assets *plus* net property, plant, and equipment *plus* other noncurrent assets (including intangible assets, deferred items, and investments and advances). ***Common equity*** represents common shareholders' interest in the company, includes common stock (including effects of common treasury stock), capital surplus, retained earnings, treasury stock adjustments for both common and nonredeemable preferred stock. ***Revenue*** represents gross sales reduced by cash discounts, trade discounts, and returned sales and allowances for which credit is given to customers. ***Operating Income*** represents the operating income of a company after deducting expenses for Cost of Goods Sold, Selling, General, and Administrative Expense, and Depreciation, Depletion, and Amortization. ***Net Income*** represents the fiscal period income or loss reported by a company after subtracting expenses and losses from all revenues and gains. ***Tobin's Q*** represents (*Book Value of Debt + Market*

Value of Equity) / (*Book Value of Debt + Book Value of Equity). **Annual ROA*** is defined by (*Operating Income / Total Assets*) * 4. ***Market Value of Equity*** represents *Common Shares Outstanding * Price Per Share* as of the end of the relevant quarter. ***Age*** represents the Current Year – 1994. ***Industry Adjusted Tobin's Q*** is *Tobin's Q* - Industry Average Tobin's Q (across all firms in that particular industry, targets and non-targets). ***Industry Adjusted Annual ROA*** is *Annual ROA* – Industry Average Annual ROA (across all firms in that particular industry, targets and non-targets). All data are from the Compustat / CRSP database. ***Tobin's Q*** and ***Annual ROA*** are winsorized at the 5% level. Panel A shows the mean, median, and 25th and 75th percentiles for all variables.

Panel A: Descriptive Statistics of 896 Targets from 1995 – 2011

Variable	Mean	25th	50th	75th
Total Assets	2,308.00	83.17	301.46	1,179.16
Ln (Total Assets)	5.79	4.42	5.71	7.07
Common Equity	724.81	34.71	110.81	398.31
Ln (Common Equity)	4.85	3.61	4.74	6.01
Quarterly Revenue	348.80	15.10	57.42	222.79
Quarterly Operating Income	32.11	(0.67)	1.85	12.40
Quarterly Net Income	5.22	(3.09)	0.50	4.25
Tobin's Q	2.37	0.97	1.43	2.23
Annual ROA	0.08	0.03	0.07	0.13
Market Value of Equity	6,906.20	75.61	587.47	3,299.14
Ln (Market Value of Equity)	6.26	4.39	6.39	8.11
Age	10.20	7.00	11.00	13.00
Ln (Age)	2.18	1.95	2.40	2.56
Industry Adjusted Tobin's Q	-1.77	-3.78	-2.00	-0.93
Industry Adjusted Annual ROA	0.09	0.00	0.07	0.16

Panel B: Sector Analysis of *Tobin's Q* and *Annual ROA* for the 896 Targets from 1995 – 2011

		Tobin's Q		Annual ROA		Industry Adjusted Tobin's Q		Industry Adjusted Annual ROA	
Target Sector	Observations	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Consumer Discretionary	204	1.654	1.338	0.057	0.071	-1.659	-1.975	0.011	0.025
Consumer Staples	38	2.441	1.638	-0.001	0.080	-0.919	-1.723	-0.060	0.022
Energy	33	2.625	1.846	0.064	0.073	-1.568	-2.348	-0.060	-0.050
Financials	119	1.357	1.217	0.060	0.066	-0.602	-0.742	0.024	0.030
Health Care	130	5.352	1.948	0.087	0.073	-1.128	-4.533	0.272	0.258
Industrials	120	1.692	1.295	0.065	0.071	-1.188	-1.586	0.032	0.038
Information Technology	180	2.315	1.584	0.135	0.073	-4.100	-4.831	0.184	0.122
Materials	39	2.046	1.655	0.050	0.066	-0.946	-1.336	0.037	0.053
Telecommunication Services	13	2.191	1.773	-0.001	0.072	-1.166	-1.584	0.016	0.089
Utilities	20	1.377	1.327	0.111	0.113	-0.308	-0.359	0.052	0.054

Panel C: *Industry Adjusted Tobin's Q* and *Annual ROA* by Year for 896 activist targets from 1995 – 2011

Year	Number of Observations	Industry Adjusted Tobin's Q	Industry Adjusted Annual ROA
1995	9	0.383	0.092
1996	30	1.015	0.069
1997	55	0.653	0.156
1998	53	-1.765	0.087
1999	34	-1.934	0.067
2000	38	-1.614	0.088
2001	36	-2.614	0.057
2002	47	-3.036	0.082
2003	37	-1.993	0.079
2004	54	-2.055	0.083
2005	93	-2.265	0.077
2006	80	-1.388	0.100
2007	110	-0.858	0.058
2008	74	-2.900	0.102
2009	41	-2.675	0.102
2010	51	-2.659	0.069
2011	54	-2.550	0.076

Table II: Evolution of Tobin's Q and ROA in the Three Years Post-Intervention

Table II Panel A provides the mean, median, standard deviation and number of target observations for ***Tobin's Q*** and ***Annual ROA*** for four different years: the year of activist intervention (within three quarters of the activist intervention), the year after an activist intervention, two years after an activist intervention, and three years after an activist intervention. Panel B shows the same progression for ***Industry Adjusted Tobin's Q*** and ***Industry Adjusted Annual ROA***. Panel C shows ***Industry Adjusted Tobin's Q*** for technology and non-technology targets in the three years after an intervention**.** Panel D shows ***Industry Adjusted Annual ROA*** for technology and non-technology targets in the three years after an intervention**.** Panel E shows ***Industry Adjusted Tobin's Q*** for pre and post-crisis targets in the three years after an intervention**.** Panel F shows ***Industry Adjusted Annual ROA*** for pre and post-crisis targets in the three years after an intervention**.** Panel G shows ***Tobin's Q*** for the activist targets up to three years post-intervention. Panel H shows ***Annual ROA*** for the activist targets up to three years post-intervention. All data are from the Compustat / CRSP database. ***Tobin's Q*** and ***Annual ROA*** are winsorized at the 5% level.

Panel A: Tobin's Q and Annual ROA for 896 Activist Targets

Tobin's Q:

	t: Event Year	*t+1*	*t+2*	*t+3*
Average	2.3716	2.4085	2.8262	2.4908
Standard Deviation	5.5523	6.7137	10.9946	5.7188
Median	1.4276	1.4129	1.4388	1.3969
Observations	896	825	747	663

Panel B: Industry Adjusted Tobin's Q and Annual ROA for 896 Activist Targets

Industry Adjusted Tobin's Q

	t: Event Year	*t+1*	*t+2*	*t+3*
Average	-1.768	-1.5848	-1.1202	-1.4896
Standard Deviation	5.5463	6.6762	10.9156	5.6438
Median	-1.9967	-1.9077	-1.8702	-1.8728
Observations	896	820	743	655

Industry Adjusted Annual ROA

	t: Event Year	*t+1*	*t+2*	*t+3*
Average	0.0847	0.0749	0.0629	0.0723
Standard Deviation	0.3196	0.2688	0.3044	0.1861
Median	0.0662	0.062	0.0628	0.0673
Observations	896	820	743	655

Panel C: Industry Adjusted Tobin's Q for Technology and Non-Technology Targets

Non-Technology Targets

Industry Adjusted Tobin's Q

	t: Event Year	*t+1*	*t+2*	*t+3*
Average	-1.18	-1.3717	-1.2211	-1.0304
Standard Deviation	5.7215	4.5454	3.5937	5.8503
Median	-1.7014	-1.5938	-1.5161	-1.5691
Observations	716	677	618	541

Technology Targets

Industry Adjusted Tobin's Q

	t: Event Year	*t+1*	*t+2*	*t+3*
Average	-4.1002	-2.5935	-0.6216	-3.6684
Standard Deviation	4.0274	12.5489	25.4641	3.872
Median	-4.8309	-4.8226	-4.8515	-4.7442
Observations	180	143	125	114

Panel D: Industry Adjusted Annual ROA for Technology and Non-Technology Targets

Non-Technology Targets

Industry Adjusted Annual ROA

	t: Event Year	*t+1*	*t+2*	*t+3*
Average	0.0595	0.0556	0.0467	0.0572
Standard Deviation	0.2183	0.1907	0.2814	0.1763
Median	0.0509	0.0453	0.0453	0.0468
Observations	716	677	618	541

Technology Targets

Industry Adjusted Annual ROA

	t: Event Year	*t+1*	*t+2*	*t+3*
Average	0.1844	0.1659	0.1429	0.1436
Standard Deviation	0.5542	0.4833	0.3908	0.2134
Median	0.1222	0.1249	0.1272	0.1229
Observations	180	143	125	114

Panel E: Industry Adjusted Tobin's Q for Pre and Post-crisis Targets

Pre-Crisis Targets

Industry Adjusted Tobin's Q

	t: Event Year	*t+1*	*t+2*	*t+3*
Average	-1.6553	-1.6231	-1.0429	-1.4694
Standard Deviation	5.8684	6.6888	11.6086	5.9106
Median	-1.9874	-1.9432	-1.8885	-1.8949
Observations	782	717	649	572

Post-Crisis Targets

Industry Adjusted Tobin's Q

	t: Event Year	*t+1*	*t+2*	*t+3*
Average	-2.5467	-1.3183	-1.6537	-1.6285
Standard Deviation	2.1749	6.6141	3.3667	3.2786
Median	-2.1279	-1.5991	-1.4598	-1.3773
Observations	114	103	94	83

Panel F: Industry Adjusted Annual ROA for Pre and Post-crisis Targets

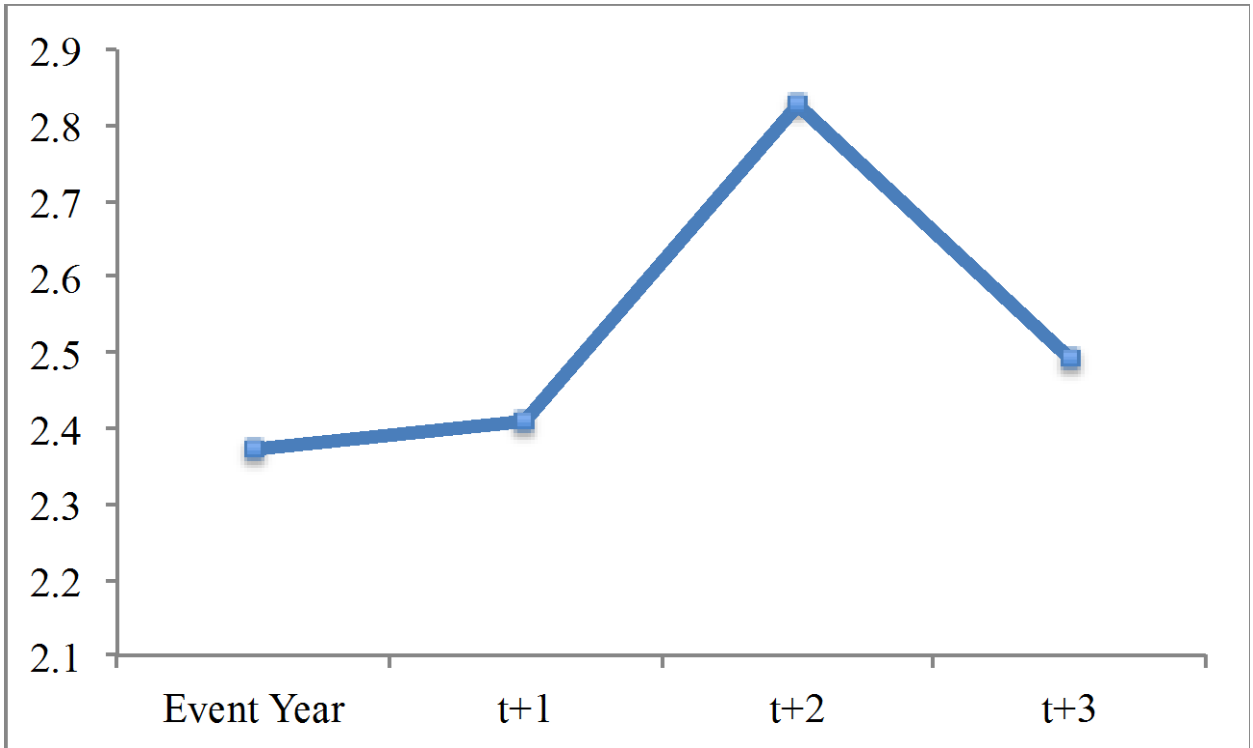
Pre-Crisis Targets
Industry Adjusted Annual ROA

	t: Event Year	*t+1*	*t+2*	*t+3*
Average	0.0858	0.0792	0.0669	0.0719
Standard Deviation	0.3348	0.2769	0.2681	0.1862
Median	0.0661	0.0655	0.0621	0.0675
Observations	782	717	649	572

Post-Crisis Targets
Industry Adjusted Annual ROA

	t: Event Year	*t+1*	*t+2*	*t+3*
Average	0.0765	0.0443	0.0352	0.0752
Standard Deviation	0.1829	0.2025	0.4876	0.1867
Median	0.0726	0.0517	0.0654	0.0608
Observations	114	103	94	83

Panel G: Tobin's Q for 896 Activist Targets in the Three Years Post-Intervention



Panel H: Annual ROA for 896 Activist Targets in the Three Years Post-Intervention

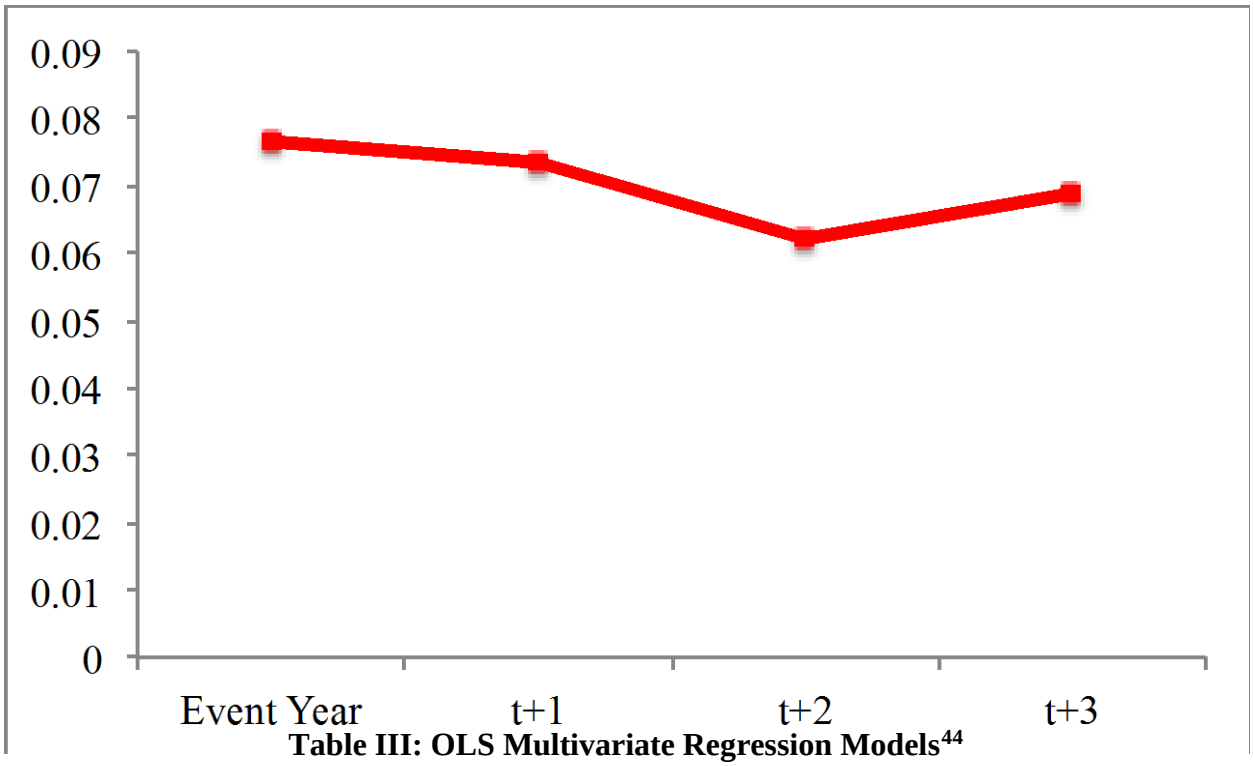


Table III: OLS Multivariate Regression Models[44]

Table III Panel A shows the results of Models 1, 2, 7 and 8. I regress ***Industry Adjusted Tobin's Q*** (Models 1 and 2) and ***Industry Adjusted Annual ROA*** (Models 7 and 8) on various company characteristics to determine how activist interventions affect the long-term performance of targets. The main variables of interest are ***Event Year***, ***T+1***, ***T+2***, and ***T+3***, which show the difference in ***Industry Adjusted Tobin's Q*** or ***Industry Adjusted Annual ROA*** between activist targets and the matched sample for the relevant number of years after an activist intervention. ***Event Year*** is an indicator variable with a value of 1 if that observation represents a company that had been targeted within the past year. ***T+1*** is an indicator variable with a value of 1 if that observation represents a company that had been targeted between 4 and 7 quarters ago. ***T+2*** is an indicator variable with a value of 1 if that observation represents a company that had been targeted between 8 and 11 quarters ago. ***T+3*** is an indicator variable with a value of 1 if that observation represents a company that had been targeted between 12 and 15 quarters ago. All regressions control for company size, measured by ***Ln(Market Value of Equity)*** and company age, measured by ***Ln(Age)***. Furthermore, all models include yearly fixed effects and pre-event dummy variables. Panel B shows the regression results of introducing the pre and post-crisis interaction effect. ***Crisis Event Year*** represents ***Pre-Post Crisis * Event Year***, ***Crisis T+1*** represents ***Pre-Post Crisis * T+1***, ***Crisis T+2*** represents ***Pre-Post Crisis * T+2***, and ***Crisis T+3*** represents ***Pre-Post Crisis * T+3***. Panel C shows the regression results of introducing the technology interaction effect. ***Technology Event Year*** represents ***Information Technology * Event Year***, ***Technology T+1*** represents

[44] Data definitions and formulas can be found in the Data Appendix section.

Information Technology * T+1, ***Technology T+2*** represents ***Information Technology * T+2***, and ***Technology T+3*** represents ***Information Technology * T+3***. Models 1, 3, 5, 7, 9 and 11 include company fixed effects, while Models 2, 4, 6, 8, 10, and 12 include industry fixed effects. All data are from the Compustat / CRSP database. ***Tobin's Q*** and ***Annual ROA*** are winsorized at the 5% level. All standard errors are clustered by company as a robustness check. Coefficients marked with *** are significant at the 1% level, ** at the 5% level, and * at the 10% level.

Panel A: OLS Multiple Regression Results

	(1)	(2)	(7)	(8)
Dependent Variable	Q	Q	ROA	ROA
Event Year	-1.106***	-2.138***	0.031***	0.055***
	(-4.96)	(-5.92)	(3.60)	(6.42)
T+1	-0.486	-1.644***	0.030***	0.055***
	(-1.59)	(-4.34)	(3.75)	(6.59)
T+2	-0.567***	-1.523***	0.024**	0.047***
	(-2.72)	(-3.81)	(2.46)	(4.66)
T+3	-0.285	-1.491***	0.023**	0.052***
	(-1.26)	(-3.49)	(2.17)	(5.25)
Ln(Market Value of Equity)	1.085***	0.586***	0.039***	0.45***
	(19.97)	(35.25)	(14.56)	(32.88)
Ln(Age)	-1.579***	-0.462***	-0.024***	(0.030)***
	(-10.30)	(-5.28)	(-5.03)	(-12.95)
Year Fixed Effects	Y	Y	Y	Y

Panel B: OLS Multiple Regression Results with Pre Post-Crisis Interaction Effect

Dependent Variable	(3) Q	(4) Q	(9) ROA	(10) ROA
Event Year	-1.059***	-2.213***	0.036***	0.057***
	(-4.69)	(-10.70)	(4.32)	(6.85)
T+1	-0.526	-1.747***	0.035***	0.055***
	(-1.54)	(-5.20)	(4.28)	(6.40)
T+2	-0.641***	-1.608***	0.024**	0.043***
	(2.91)	(-6.83)	(2.29)	(3.85)
T+3	-0.310	-1.466***	0.023**	0.048***
	(-1.26)	(-5.90)	(2.03)	(4.35)
Ln(Market Value of Equity)	1.108***	0.586***	0.039***	0.046***
	(19.98)	(16.12)	(14.57)	(32.89)
Ln(Age)	-1.581***	-0.463***	-0.024***	-0.030***
	(-10.30)	(-3.49)	(-5.04)	(-12.87)
Crisis Event Year	-0.380	0.578*	-0.41*	-0.016
	(-0.50)	(1.75)	(-1.78)	(-0.82)

Panel C: OLS Multiple Regression Results with Technology Interaction Effect

Dependent Variable	(5) Q	(6) Q	(11) ROA	(12) ROA
Event Year	-0.639***	-1.612***	0.022***	0.035***
	(-2.73)	(-7.80)	(3.14)	(4.40)
T+1	-0.540***	-1.567***	0.023***	0.035***
	(-3.14)	(-9.42)	(3.23)	(4.41)
T+2	-0.385**	-1.229***	0.019**	0.029***
	(-2.10)	(-6.85)	(2.14)	(3.02)
T+3	-0.100	-1.030***	0.013	0.029***
	(-0.40)	(-3.99)	(1.44)	(3.11)
Ln(Market Value of Equity)	1.085***	0.586***	0.039***	0.045***
	(19.97)	(16.12)	(14.56)	(32.88)
Ln(Age)	-1.579***	-0.462***	-0.024***	-0.030***
	(-10.30)	(-3.50)	(-5.04)	(-12.96)
Technology Event Year	-2.444***	-2.745***	0.044	0.106***

Table III: F-Tests Results

Table III shows the results of the F-Tests that were conducted to examine the difference in ***Industry Adjusted Tobin's Q*** and ***Industry Adjusted Annual ROA*** over time for specific targets. The F-Tests are estimated on the coefficients from Models 1, 2, 7, and 8 (the models without any interaction effects). The first two columns represent Models 1 and 2, while the second two columns represent Models 7 and 8. The F-Tests examine the hypothesis that the difference between the coefficients on the two variables of interest ((*T+1) vs. (T-1)*, (*T+2) vs. (T-1)*, etc.) is equal to zero. ***T-1*** is an indicator variable with a value equal to 1 if the observations represents a company that was targeted within the next year. ***T*** is ***Event Year***, which is an indicator variable with a value of 1 if that observation represents a company that had been targeted within the past year. ***T+1*** is an indicator variable with a value of 1 if that observation represents a company that had been targeted between 4 and 7 quarters ago. ***T+2*** is an indicator variable with a value of 1 if that observation represents a company that had been targeted between 8 and 11 quarters ago. ***T+3*** is an indicator variable with a value of 1 if that observation represents a company that had been targeted between 12 and 15 quarters ago. All data are from the Compustat / CRSP database. ***Tobin's Q*** and ***Annual ROA*** are winsorized at the 5% level. All standard errors are clustered by company as a robustness check. Coefficients marked with *** are significant at the 1% level, ** at the 5% level, and * at the 10% level.

F-Tests	*Company FE Q*	*Industry FE Q*	*Company FE ROA*	*Industry FE ROA*
Relative to (t-1)	-1.431909	-2.493493	0.0255149	0.0550128
(t+1) vs (t-1)	0.946***	0.849***	0.004	-0.001
F stat	8.68	7.92	0.32	0.01
p value	0.32%	0.49%	57.10%	93.10%

VII. DATA APPENDIX

Age: current year of observation – 1994

Annual Return on Assets (Annual ROA): (Operating Income / Total Assets) * 4

Book Value of Debt: the total amount of short-term notes + the current portion of long-term debt that is due in one year + debt obligations due more than one year from the company's Balance Sheet date or due after the current operating cycle

Book Value of Equity: common shareholders' interest in the company, includes common stock (including effects of common treasury stock), capital surplus, retained earnings, treasury stock adjustments for both common and nonredeemable preferred stock

Capital Expenditures: the funds used for additions to property, plant and equipment, excluding amounts arising from acquisitions for an operating segment

Common Equity: common shareholders' interest in the company, includes common stock (including effects of common treasury stock), capital surplus, retained earnings, treasury stock adjustments for both common and nonredeemable preferred stock

Common Shares Outstanding: the net number of all common shares outstanding at year-end for the annual file, and as of the Balance Sheet date for the quarterly file excluding treasury shares

*Market Value of Equity: Common Shares Outstanding * Price per Share*

Crisis Event Year: *Pre Post-Crisis * Event Year*

Crisis T+1: *Pre Post-Crisis * T+1*

Crisis T+2: *Pre Post-Crisis * T+2*

Crisis T+3: *Pre Post-Crisis * T+3*

Event Year: indicator variable with a value of 1 if that observation represents a company that had been targeted within the past year

Has Been Targeted: indicator variable with a value of 1 if that company has been the subject of an activist intervention at any time

Industry: sector classification per Compustat, which uses Global Industry Classification Standard

Industry Adjusted Annual ROA: Annual ROA – Industry Average Annual ROA (across all firms in that particular industry, targets and non-targets)

Industry Adjusted Tobin's Q: Tobin's Q – Industry Average Tobin's Q (across all firms in that particular industry, targets and non-targets)

Industry Fixed Effects: indicator variables for each industry, controlling for industry differences in *Tobin's Q* and *Annual ROA*

Information Technology: indicator variable representing whether that company belongs to the Information Technology industry, as classified by GICS

Leverage: *Book Value of Debt / Book Value of Equity*

Net Income: the fiscal period income or loss reported by a company after subtracting expenses and losses from all revenues and gains

Operating Income: the operating income of a company after deducting expenses for Cost of Goods Sold, Selling, General, and Administrative Expense, and Depreciation, Depletion, and Amortization

Pre-Event Dummies: indicator variables representing whether that observation was a company that would be targeted within the next year, two years, or three years

Pre Post-Crisis: indicator variable with a value of 1 if that specific target was invested in after 2009 Q3 (first quarter when U.S. GDP turned positive since 2008); value of 0 if intervention occurred prior to this quarter

Price per Share: closing price as of the end date of the relevant quarter

Revenue: gross sales reduced by cash discounts, trade discounts, and returned sales and allowances for which credit is given to customers

T+1: indicator variable with a value of 1 if that observation represents a company that had been targeted between 4 and 7 quarters ago

T+2: indicator variable with a value of 1 if that observation represents a company that had been targeted between 8 and 11 quarters ago

T+3: indicator variable with a value of 1 if that observation represents a company that had been targeted between 12 and 15 quarters ago

Target: indicator variable with a value of 1 if that quarterly observation represents an activist intervention in that quarter, otherwise has a value of 0

Technology Event Year: *Information Technology * Event Year*

Technology T+1: *Information Technology * T+1*

Technology T+2: *Information Technology * T+3*

Technology T+3: *Information Technology * T+3*

Tobin's Q: (*book value of debt + market value of equity*) / (*book value of debt + book value of equity)* – timing convention for book value of equity is explained in the Data section

Total Assets: current assets *plus* net property, plant, and equipment *plus* other noncurrent assets (including intangible assets, deferred items, and investments and advances)

Yearly Fixed Effects: indicator variables for each year based on the current time period, controlling for yearly fluctuations in macroeconomic activity