Where Do Shareholder Gains in Hedge Fund Activism Come From? Evidence from Employee Pension Plans

Anup Agrawal and Yuree Lim*

December 2020

Comments welcome

*Agrawal: University of Alabama, Culverhouse College of Commerce, Tuscaloosa, AL 35487-0224, aagrawal@cba.ua.edu, (205) 348-8970; Lim: University of Wisconsin-La Crosse, College of Business Administration, La Crosse, WI 54601, ylim@uwlax.edu, (608) 785-6679. We thank Ilona Babenko, Jonathan Berk, Philip Bond, Ben Branch, David Cicero, Doug Cook, Simon Gervais, Jack He, Joon Ho Kim, Andrew Koch, Nhan Le, Tao Li, Greg Niehaus, Sugata Ray, Brian Song, and participants at the CFEA-Tulane, CICF-Tianjin, NFA-Halifax, Stanford SITE Workshop on Labor and Finance and WFA meetings for useful comments. Special thanks are due to Alon Brav, Nick Gantchev and Joshua Rauh for detailed comments and helpful suggestions. Agrawal acknowledges financial support from the William A. Powell, Jr. Chair in Finance and Banking. Previous drafts of the paper were called, "The Dark Side of Hedge Fund Activism: Evidence from Employee Pension Plans."

Where Do Shareholder Gains in Hedge Fund Activism Come From? Evidence from Employee Pension Plans

Abstract

We find that defined benefit employee pension plans of firms that are targets of hedge fund activism experience underfunding and their defined contribution plans experience reductions in employer contributions. Pension underfunding occurs due to reduced employer contributions to the plans, which target firms justify by increasing the assumed rates of returns on plan investments and the discount rate used to compute the present value of plan obligations. Despite tilting plan investments toward riskier assets, pension fund performance does not improve after activists target a firm. Our evidence suggests that shareholder wealth gains from activism are partly wealth transfers from employees.

Keywords: Hedge fund activism, Employee pensions, Wealth transfer

JEL: G34, G23, G30

Where Do Shareholder Gains in Hedge Fund Activism Come From? Evidence from Employee Pension Plans

1. Introduction

This paper deals with two broad questions. First, does hedge fund (HF) activism enhance overall firm value? While prior studies find that stockholders of target firms earn positive returns, on average, upon announcement of HF activism, other claimants in these firms often experience adverse outcomes. Understanding the economic effects of HF activism is important because it is an important external governance mechanism (see, e.g., Brav, Jiang and Kim (2009, 2015b)). This topic is also of interest to policy makers because shareholder activism is highly regulated. Second, what are the factors that affect the financial stability of employee pension plans? This question is important for workers because underfunded pension plans put their promised pension benefits at risk. It is also important for employers because it increases the risk and reduces the value of deferred pay promised to workers. In addition, underfunded plans put a potential burden on taxpayers via the guarantees provided by the Pension Benefit Guarantee Corporation (PBGC) when the sponsoring employer defaults, and on workers whose promised pensions exceed the meager PBGC insurance limits (Cocco, 2014). This paper sheds light on both these questions by examining how employee pensions fare when firms become targets of HF activists.

Shareholder activism is an investment strategy whereby investors such as HFs attempt to use their shareholder rights to intervene in the management of a targeted firm to increase the value of their investment. Activists can nudge or push management to take shareholder-friendly actions such as increase dividends or share buybacks, do spinoffs, or be acquired. Prior studies find that

HF activism is quite successful in increasing shareholder wealth of targeted firms (see Brav, Jiang and Kim, 2009, 2015b for excellent reviews of this literature). However, there are two opposing views about the sources of these shareholder wealth gains. In the first view, activism increases the value of the target firm by enhancing firm productivity or promoting its takeover (see, e.g., Brav, Jiang and Kim, 2015a; Jiang, Li and Mei, 2018; and Boyson, Gantchev and Shivdasani, 2017). The second view is that shareholder gains from activism are due to wealth transfers from other stakeholders such as bondholders or employees (see, e.g., Klein and Zur, 2011; Coffee and Palia, 2016; and Brav, Jiang and Kim, 2015a). The two sources of shareholder gains have radically different implications about the value of activism for target firms and the broader society. If these gains arise, e.g., from operational efficiencies or facilitating a higher-valued takeover, HF activism is good for firm value and the overall society. On the other hand, if shareholder gains are merely the result of wealth transfers from other stakeholders, the value of such activism is less clear.

The purpose of this study is to uncover the role of HF activism on the welfare of a key stakeholder in the firm, namely employees. Brav, Jiang and Kim (2015a) find that HF activism decreases productivity-adjusted wages for workers. Except for this study, empirical evidence on the effect of activism on employees is quite limited.[1] More importantly, to our knowledge, no prior study has analyzed the effect of HF activism on employee pensions. This paper aims to fill this gap in the literature by examining the effect of HF activism on the welfare of employees, by focusing on employee pensions. Specifically, we study whether HF activism helps or hurts

[1] Relatedly, Grennan (2014) finds that greater shareholder governance decreases employee cooperation and integrity due to a greater focus on results.

employee wealth as represented by the health of their defined benefit (DB) pension plans. For completeness, we also examine employer contributions in defined contribution (DC) plans.

Anecdotal evidence suggests that HF activism hurts employee welfare. A story in the *New York Times* offers a vivid example of this phenomenon.[2] In 2012, Relational Investors, an activist fund, identified Timken Corporation, a steel and bearings maker in Ohio as a target of activism. In the summer and Fall of 2012, Relational started buying Timken stock. In November 2012, Relational publicly disclosed a 6% equity stake in Timken and launched an activist campaign against it. By September 2013, Timken was forced to replace its family CEO. In an investor presentation in November 2014, Timken reported that under the new CEO, the firm had almost eliminated its employee pension contributions, which dropped from a third of cash flow to near zero, and planned a large buyback of shares by the end of 2016. *Wall Street Journal* quotes this example[3] in pointing out, "if we continue down this road, we won't have the long-term investments in workers and innovation that we need to sustain a higher rate of growth."

Consistent with this example, we find that employees of target firms that sponsor DB pension plans suffer from greater plan underfunding after HF activism. This finding is consistent with the view that HF activists expropriate wealth from employees. We then examine the mechanisms that lead to the underfunding of pension plans. We find that targeted firms reduce

[2] See Nelson D. Schwartz, How Wall Street bent steel: Timken bows to activist investors and splits in two, *New York Times*, December 6, 2014.

[3] William A. Galston, 'Shareholder Value' Is Hurting Workers: Financiers fixated on the short-term are forcing CEOs into decisions that are bad for the country. *Wall Street Journal*, December 9, 2014.

employer contributions to the pension fund, which they justify by increasing the assumed rates of returns on plan investments and the discount rate used to compute the present value of plan obligations. They also tilt plan investments toward riskier assets, in a failed effort to boost plan returns. Activists typically exit the firm after 1.5 to 2 years (see Brav, Jiang and Kim (2009)), but the effect on employee pensions is long-term and persists over at least the next five years. While most of our paper deals with DB pension plans, about which there is more granular data, we also find that target firms reduce employer contributions in DC plans.

There are two potential interpretations of our findings. First, HF activists put pressure on managers to increase shareholder wealth and managers respond by raiding employee pension funds. Second, observable and unobservable characteristics of these firms that lead activist HFs to target them also lead the firms to underfund employee pensions. We address this identification concern in three ways. First, we match each target firm with a control firm, identified using a propensity score matching (PSM) procedure, which controls for observable firm characteristics. We then use a difference-in-differences (DiD) approach and draw inferences based on contemporaneous changes in treatment vs. control firms in years before vs. after HF activism. Moreover, within this framework, we use firm fixed effects regressions, which remove the effects of time-invariant firm characteristics, whether observable or not.

Second, underfunding appears to be due to M&A or governance pressure imposed by activists on managers. Moreover, future increases in pension underfunding explain the stock price reaction to activism announcement, which provides a direct test of the wealth transfer hypothesis. We find that in firms with DB pension plans, about seven percent of shareholder wealth gains at the announcement of activism come from employee pensions. Finally, we conduct tests of several alternative hypotheses suggested by Brav, Jiang and Kim (2015a) to disentangle the effect of HF

activism from mere stock picking. These tests confirm that our results are not driven by alternative hypotheses such as voluntary reforms by management, activists' stock-picking skills, mean-reversion, financial distress, or attrition bias.

We refer to the increase in underfunding of employee pension plans following HF activism as wealth transfers from employees for three reasons. First, these plans were already substantially underfunded, on average by 24% in the year before targeting (see Table 2). Second, while PBGC insures the plans in case the firm goes bankrupt, PBGC's coverage limits are modest, up to an annual pension of about $60,000 for a 65- year old retiree for a plan terminated in 2016. Finally, PBGC's own financial health is in question. The U.S. Government Accountability Office (GAO) has designated PBGC's single-employer program as 'high risk' since July 2003 and added this designation to multi-employer plans since January 2009 (see U.S. GAO (2017)). These facts do not support the idea that HF activism forces managers to eliminate overfunding of pension funds of 'fat-cat employees.' Our finding of an increase in underfunding of employee pension plans following HF activism supports the Shleifer and Summers (1988) notion of a breach of trust with employees.

Our study contributes to several strands of the literature. First, we provide empirical evidence on a source of shareholder gains from HF activism. Prior studies on HF activism find mixed evidence of wealth transfers from debtholders (see, e.g., Brav, Jiang, Partnoy and Thomas, 2008; Uchida and Xu, 2008; Aslan and Maraachilian, 2009; Huang, 2009; Jiang, Li and Wang, 2012; Brav, Jiang and Kim, 2009, Klein and Zur, 2011; Sunder, Sunder and Wongsunwai, 2015; and Feng, Xu and Zhu, 2016). There is also some prior evidence of wealth transfers from employees (see Brav, Jiang and Kim, 2015a). Our paper complements this literature by showing that employee pensions suffer in HF activism events. Moreover, our finding that shareholder

wealth gains upon activism announcement increase in pension underfunding suggests a wealth transfer from employee pension funds to shareholders. Second, our study contributes to the literature that finds that as firms approach financial distress, they increase investment risk in employee pension plans (see, e.g., Bergstresser. Desai and Rauh, 2006; Cocco and Volpin, 2007; Phan and Hegde, 2013; Anantharaman and Lee, 2014; and Duan, Hotchkiss and Jiao, 2015). Third, and more broadly, we contribute to the literature on shareholder activism as well as the governance role of shareholders (see, e.g., the review articles by Gillan and Starks, 2007; Edmans and Holderness (2016); and Denes, Karpoff and McWilliams, 2017).

The paper proceeds as follows. Section 2 discusses the related literature and develops our main hypothesis. Section 3 details the data and sample. Section 4 presents our baseline results. Section 5 examines the channels through which the effect arises. Section 6 analyzes the underlying economic mechanisms. Section 7 presents identification and robustness checks. Section 8 examines defined contribution plans and section 9 concludes.

2. Prior Literature and Main Hypothesis

This paper examines whether HF activism hurts the health of employee DB pension plans, which represent employees' post-retirement wealth. We measure pension plan health using funding levels. What is underfunding of DB plans and why does it matter? A DB pension plan is a deferred compensation arrangement, whereby an employer commits to making future benefit payments to employees for services they have provided during their employment with the firm (see, e.g., Kieso, Weygandt and Warfield, 2010). Plan liabilities are the pension promises that the firm has made to its employees, and plan assets fund these liabilities. Underfunding implies that a

plan's liabilities exceed its assets, i.e., pension fund assets may be insufficient to keep its promises (see, e.g., Cocco, 2014). Thus, underfunding of a DB plan can hurt employee welfare after retirement.[4] Although most DB pension plans are insured by the PBGC under the Employee Retirement Income Security Act of 1974 (ERISA), underfunding creates problems for employees and for the society. This is because the PBGC guarantees benefits in private DB plans only up to a modest limit; this limit can change; not all pension plans are insured by the PBGC; and any losses incurred by PBGC are ultimately borne by taxpayers. Moreover, the PBGC is itself severely underfunded, with a net worth of negative $62 billion as of the end of September 2014, so its guarantee is hardly solid.[5]

More specifically, pension plan funding is defined as follows:

$$Funding = Fair\ value\ (plan\ assets) - Present\ value\ (plan\ obligations) \quad (1)$$

The present value of plan obligations is the discounted value of expected future payments to retirees. To estimate plan obligations, the employer makes assumptions about employees' life expectancy, turnover, retirement date, and future salary levels. The fair value of plan assets is defined as follows:

[4] See John Wasik, Is your pension plan underfunded? *Forbes*, September 3, 2014; and Floyd Norris, Private pension plans, even at big companies, may be underfunded, *New York Times* July 21, 2012.

[5] See Alex J. Pollock, A Federal guarantee is sure to go broke, *Wall Street Journal*, November 30, 2014).

$$Fair\ value\ (plan\ assets) = Contibutions\ \left(Minimum + \widetilde{discretionary}\right) + Return\ \widetilde{on\ plan\ assets} \quad (2)$$

The level of regulatory minimum contributions for a year is based on a complex formula that is a function of the plan's normal cost (i.e., additional pension obligations accrued from one additional year's service by employees) plus its deficit reduction contribution (Rauh, 2006). The employer can choose to contribute more than the statutory minimum, which accounts for the discretionary portion of contributions.[6] Variations in discretionary employer contributions and returns on plan assets, determined by market conditions, can cause underfunding in a DB pension plan. If a plan is underfunded, pension legislation requires employers to make additional contributions to resolve the problem.

Does HF activism cause underfunding in DB pension plans for employees in target firms? Prior studies suggest that HF activism can transfer wealth from employees to shareholders. Brav, Jiang and Kim (2015a) find that the workers of target firms do not benefit from HF activism. Although labor productivity improves after HF activists target a firm, employees experience a reduction in work hours, and their wages do not keep pace with improved productivity. Using shareholder proposals on governance, Grennan (2014) finds that shareholders realize financial gains such as increases in sales, profitability, and payouts, while target firms suffer from deterioration in customer satisfaction and employee integrity. Coffee and Palia (2016) suggest that wealth transfers from target firms' employees to their shareholders could come from reductions in

[6] Compustat reports a firm's annual employer contribution to the pension plan, but not its breakdown into the statutory minimum and discretionary portions.

employees' promised pension payouts. Thus, our main testable hypothesis is that employees of target firms are more likely to experience underfunding of their DB pension plans.

Why can HF activism cause underfunding? First, the seminal theoretical work of Sharpe (1976) and Sharpe and Treynor (1977) shows, using the option pricing model, that stockholder wealth can be increased by increasing pension risk via pension plan underfunding and risky asset allocation. Firms can transfer their pension liabilities to the PBGC in return for pension fund assets plus 30% of the market value of the firm's net worth. Thus, PBGC insurance serves as a put option where pension liabilities are the underlying asset, while pension fund assets plus 30% of the firm's net worth is the exercise price. So if the exercise price is less than the pension liability, the firm has an incentive to exercise the put option.

Second, activists can cause underfunding by demanding more cash payouts from the firm. Bean and Bernardi (2000) find a significant positive correlation between the increase in pension liabilities and dividend payments. They argue that the underfunding of pension funds is a unilateral decision by management that effectively transfers risk from stockholders to employees and the society.

Third, HF activism can hurt employee pension health by increasing takeover pressure. Stein (1988) shows that takeover pressure leads managers to sacrifice the firm's long-term interests to boost current profits. Shleifer and Summers (1988) argue that hostile takeovers enable shareholders to transfer wealth from workers to themselves. Pontiff, Shleifer and Weisbach (1990) and Rosett (1990) find that pension plan terminations rise after hostile rather than friendly takeovers, suggesting that wealth transfers from employees are a source of shareholder gains in hostile takeovers. They also find that reversions following takeovers occur primarily in DB plans, where the potential for wealth transfers is the greatest (see also Harper and Treanor, 2014).

How can HF activism cause underfunding of employee pension plans? Under pressure from shareholder activists, managers can raid employee pension wealth in at least four ways. First, they can underfund pension plans by reducing employer contributions to the plans, effectively reneging on the firm's promises to employees (Anantharaman and Lee, 2014). Second, managers can increase the assumed rates of return on plan assets to justify making lower employer contributions. Third, they can increase the discount rate to make the present value of plan liabilities appear smaller. Finally, they can freeze or terminate pension plans. Petersen (1992) finds that firms terminate their overfunded DB pension plans to relieve themselves of future benefits promised to workers. Similarly, firms can freeze underfunded DB plans to stop accumulating future benefit obligations (see Cocco (2014)).

3. Data and Methodology

3.1. Institutional background

3.1.1. Corporate pension plans

A pension plan can be either a DB plan or a defined contribution (DC) plan. A DB plan promises a specified monthly benefit at retirement.[7] The plan may state this promised benefit as an exact dollar amount, such as $1,000 per month after retirement. More commonly, it promises a benefit through a plan formula that considers such factors as salary and service (e.g., 2 percent of

[7] Detailed definitions of DB and DC plans are available at the DOL website: http://www.dol.gov/dol/topic/retirement/typesofplans.htm.

the average annual salary during the last 3 years of employment for every year of service with the employer).

A DC plan does not promise a specific amount of benefit at retirement. In these plans, the employee, the employer or both contribute to the employee's individual account under the plan, sometimes at a set rate, such as 5 percent of earnings annually. These contributions generally are invested on the employee's behalf. Employees ultimately receive the balance in their accounts, which equal contributions plus investment gains or losses. The value of the account fluctuates with changes in the value of the investments and contributions. Examples of defined contribution plans include 401(k) plans, 403(b) plans, employee stock ownership plans (ESOP), and profit-sharing plans.

3.1.2. HF activism

When a person or group of shareholders acquires beneficial ownership of more than 5% of a voting class of a company's securities, they are required to file a Schedule 13D with the SEC in accordance with the Securities and Exchange Act of 1934. The initial 13D must be filed within 10 days of the shareholders taking their stake. In general, shareholders who acquire greater than a 5% stake and intend to change or influence the control of the target must file a 13D, while those who do not intend to engage in any activism file a 13G instead. A beneficial owner having filed an initial 13D is required to file an amended 13D/A promptly if any material change occurs in the contents disclosed in the initial 13D. Item 4 of a 13D filing reports the purpose of the transaction. A filing can indicate multiple purposes.

3.2. Sample selection

3.2.1. Pension data

Our first pension dataset comes from Compustat Pension annual data files from 1996 to 2016 for tests of underfunding. For tests of other pension characteristics, our sample period varies somewhat, depending on data availability. For example, data on pension investment returns start in 1998 because that is when return disclosure began, following the Statement of Financial Accounting Standards (SFAS) 132.

Our second dataset on corporate pension plans is the IRS Form 5500 Private Pension Plan Research Files, available from the U.S. Department of Labor (DOL) for the years from 2000 to 2014. Under ERISA and the Internal Revenue Code, most private-sector employer sponsored employee benefit plans are required to provide annual reports on the plan's financial condition, investments, and operations with the DOL, Internal Revenue Service (IRS), and the PBGC. Form 5500 contains pension asset and liability values, and must be filed annually by pension plan sponsors for plans with greater than 100 participants.

3.2.2. HF activism data

HF activism data come from the Audit Analytics Shareholder Activism database. Recent research on shareholder activism focuses on HF activism and uses limited, proprietary data. Our data is from a comprehensive database of all initial and amended Schedule 13D filings by all types of investors from 2001 to 2014. We focus on large outside shareholders who are not affiliated with the target. To identify the type of shareholder activist, we use Form D filings, Bloomberg Terminal, Internet sources, and news searches. Pooled investment funds, such as HF, have to file a Form D with the SEC within 15 days of an exempt offering of securities. Item 4 of the Form D filing

contains a box that identifies the fund as either a HF, private equity, venture capital, or other investment fund. But the availability of Form D filings in the SEC Edgar database is very limited before 2009. When a Form D is unavailable or fund classification cannot be determined from it, Bloomberg is another reliable source of data on the type of the investment fund. Bloomberg does not suffer from a self-reporting bias because most institutional investors such as HFs are customers of Bloomberg and maintain business relationships with it (see, e.g., Bae, Baik and Kim, 2011). Our final sample consists of 544 HF activism events with Compustat pension plan data and a matched control firm (see section 3.3).

3.2.3. Other data

Financial accounting and stock return information come from Compustat annual files and CRSP daily files, respectively. Data on other firm characteristics are from Thomson Financial, IBES, and RiskMetrics.

Table 1 reports the annual number of HF activism events and the industry distribution of target firms. The number of activism events reached a high of 58 in 2008 and a low of 24 in 2013 over our sample period. 'Other manufacturing,' finance and business equipment makers are the most frequent targets of HF activism.

3.3. Matching

To address potential selection bias and control for firm heterogeneity, we match our sample of firms targeted by HF activists (henceforth, target firms) with a control sample constructed using the propensity score matching (PSM) method similar to Brav, Jiang, Ma and Tian (2018). We require that the control firm not be targeted by an activist HF during our sample period. For each

target, the firm we pick as control has the closest propensity score from among all firms in the target's 2-digit SIC industry on Compustat in the year of activism announcement. Sampling is without replacement and matching is one-to-one, so each target firm is matched with a different control firm. Matching in PSM is based on lag 1 of Tobin's Q, leverage, ROA and log of market value.

We report summary statistics of firm and pension plan characteristics of target and control firms one year prior to the year of targeting. Panel A of Table 2 presents the mean value for each group, *t*-statistics for differences between them, followed by median values and the *p*-value of the Wilcoxon test for differences between the two distributions for variables used in subsequent regressions. The mean assumed rate of return on pension plan investments (*PPROR*) is somewhat higher for target firms than for control firms (7.44% vs. 7.09%), as is the discount rate used to compute the present value of plan liabilities (5.62% vs. 5.37%), log of firm age (2.94 vs. 2.82), and institutional ownership (48% vs. 42%). Other than that, the two samples are quite similar in terms of firm and plan characteristics. This similarity between the target and control samples suggests that our results are not driven by differences in firm characteristics. All our subsequent regressions control for log of firm age. In the baseline specification, we do not match on institutional ownership because hedge fund activists tend to target firms with higher institutional ownership to form coalitions that are effective in pressuring the firm (see the wolf pack theory of Brav, Dasgupta and Matthews, 2019). Nonetheless, Appendix C reports the results of a robustness check of our baseline results on underfunding with additional matching variables in propensity score matching, with similar results.

Following Gantchev and Jotikasthira (2017), we also examine the aggregate change in mutual fund holdings of the stocks of target and control firms. We start by obtaining mutual fund

holdings data over 2000-2016 from Thomson Reuters. We then calculate ΔMF as the average net change in quarterly mutual fund holdings (in number of shares) since the prior report, divided by the number of shares outstanding at the beginning of the quarter for a given firm in a given year. The change in mutual funds' holding of targets (0.05%) is somewhat lower than that in non-targets (0.16%), although the difference is statistically insignificant.

Panel B of Table 2 presents our tests of the parallel trends assumption in a univariate setting. Given our later finding in Table 3 that underfunding of pension plans in target firms increases over the two years following the year of HF activism relative to control firms, we want to make sure that the growth rate of underfunding before activism was not already higher in target firms than in control firms. There is no evidence of significantly higher growth rates for target firms relative to control firms based on either mean or median values of the one-year or two-year growth rates in *Underfund* as of year -1. Figure 1 shows the pre- and post-trends in mean underfunding rates of target and control firms over a much longer period, from 5 years before to 5 years after the year of the activism event. There is essentially no difference in the trend of underfunding for the two groups of firms up until year 0. After that, the underfunding level increases dramatically for targets, while it drops for control firms. This evidence satisfies the assumption of parallel pre-trends necessary for our DiD analysis.

Panel C of Table 2 presents tests of the parallel trends assumption in a multivariate setting. We estimate the following regression:

$$Target_i = \alpha_0 + \alpha_1 \text{oneyear or twoyear growth rates in } Underfund_{i,t-1} + \underline{\alpha_2} Control_{i,t} + \underline{\alpha_3} Year_t + \underline{\alpha_4} Industry_{j(i)} + \varepsilon_{i,t} \quad (3)$$

where the dependent variable *Target*$_i$ equals one if firm i is a target of activism over the sample period; it equals zero otherwise. The key independent variables are one-year or two-year growth rates in *Underfund* as of year -1. $Control$ is a vector of firm i's controls. Appendix A defines all the variables. Panel C shows that growth rates in underfunding are not significant determinants of the probability of becoming a target. Thus, there is no evidence that activists are more likely to target firms with differential growth in pension underfunding.

3.4. Methodology

To test the underfunding hypothesis, we examine the relation between HF activism and corporate pension funding status. The pension sample consists of firm-year level observations from 1996 to 2016, where the sample of firms is limited to HF targets and their matched firms over 2001-2014. Following Brav, Jiang, Ma and Tian (2018), our main regression adopts the difference-in-differences (DiD) approach:

$$Y_{i,t} = \alpha_0 + \alpha_1 Post_{i,t} + \alpha_2 Target_i \times Post_{i,t} + \underline{\alpha_3} Control_{i,t} + \underline{\alpha_4} Year_t + \underline{\alpha_5} Firm_i + \varepsilon_{i,t} \quad (4)$$

where the dependent variable $Y_{i,t}$ is *Underfund* for firm i at time t. *Target*$_i$ equals one if firm i is a target of activism over the sample period; it equals zero otherwise. *Post*$_{it}$ equals one if the firm-year (i,t) observation falls within $[t + 1, t + 2]$ years of an activism event or a pseudo-event; it equals zero otherwise. We pick the initial year of activism (t) in cases where a firm is targeted multiple times over 2001-2014. $Control$ is a vector of firm i's controls. We also include year and firm fixed effects to eliminate macroeconomic and firm-specific effects. The regressions do not control for *Target*$_i$ because its effect is subsumed in firm fixed effects. We report *t*-statistics based on standard errors clustered at the firm level, or firm and year level.

3.5. Dependent variables

We test our main hypothesis with *Underfund* as the dependent variable. These analyses are at the firm-year level. We define *Underfund* as the present value (PV) of pension liabilities minus fair value of pension assets, all divided by the PV of pension liabilities. So a high *Underfund* indicates a poorly funded pension plan (Anantharaman and Lee, 2014). We also examine employer contribution, the assumed rate of return on plan investments (*PPROR*), pension asset allocation to equity (*%Equity*), actual return on plan assets (*Return*), and the discount rate used to compute the PV of plan liabilities (*Discountrate*). *Contribution* is the log of employer contributions in $ millions. Finally, while most of our analysis deals with DB plans for which there is a more information, for the sake of completeness, we also analyze employer contribution to DC plans, using data from the IRS research file.

3.6. Key independent variable

We test our main hypothesis using a difference-in-differences framework as in equation (4). Our main interest is in the coefficient α_2, which compares the change in the level of underfunding in target firms post-activism to that in matched firms.

3.7. Control variables

We control for various plan characteristics such as plan size, the chosen discount rate, and pension duration, and tax rate as these may affect plan funding status (see, e.g., Rauh, 2009; Amir and Gordon, 1996; Asthana, 1999; Sundaresan and Zapatero, 1997). Specifically, a high marginal tax rate creates stronger incentives to fund pension plans and invest in highly taxed assets (Black, 1980; Thomas, 1988; Frank, 2002). We control for the chosen discount rate as distressed firms

manipulate the assumed discount rate to reduce pension liabilities (Amir and Gordon, 1996; Asthana, 1999). We control for pension duration, as younger participants generally prefer larger asset allocations to risky assets (Sundaresan and Zapatero, 1997; Rauh, 2009).

We also control for firm characteristics that can affect funding status and the probability of targeting by HF activists. Specifically, we control for firm size, book-to-market ratio (as a proxy for investment opportunities), leverage, profitability, firm value, and firm age. Finally, we control for cash flow from operations and its standard deviation because underfunded firms are more likely to be cash-constrained (see, e.g., Coronado and Liang, 2005).

4. Baseline Results

Table 3 reports our regression results on the level of pension underfunding. They support our main hypothesis that employees of target firms experience underfunding of DB pension plans over the two years after activism events. The standard errors are not clustered in column (1); in columns (2) and (3), they are clustered at the firm level, and firm and year level, respectively. The coefficient of $Target_i$ x $Post_{it}$ is positive and statistically significant in all three columns. This result indicates that pension plans of firms targeted by HF activists experience an increase in underfunding relative to their normal levels, compared to increases experienced by otherwise similar control firms. The last three rows of the table show that the marginal effect of the DiD term Target*Post is 0.024, which implies that relative to control firms, DB pension plans of target firms experience a greater increase in underfunding of 2.4% of projected benefit obligations per year over the years [t+1, t+2], where t is the year of targeting. This represents a non-trivial increase of

about 12.3% relative to the mean underfunding level of 19.5%. This finding suggests that shareholder activism results in increased risk for employee pensions.

Prior studies find differential effects of HF activism between the initial wave through 2007 (e.g., Brav et al., 2008) and the second wave starting with the 2008 financial crisis (e.g., Krishnan, Partnoy and Thomas, 2016). So, we next examine whether our results differ between the early and later parts of our sample. In Panel B of Table 3, we show the results corresponding to column (3) in Panel A for two equal halves of our sample period: 2001-2007 and 2008-2014. The coefficient estimate of *Target*Post* is roughly similar between the two sub-periods, and the two are statistically indistinguishable from each other (p-value for the difference = 0.82).

Finally, we examine reputation effects of HF activism. Krishnan, Partnoy and Thomas (2016) find that high reputation HF activists tend to be more influential. So, we next examine whether activist reputation plays a role in pension underfunding by target firms. In Panel C of Table 3, using a composite of the three reputation measures used by Krishnan, et al., we partition our results into targets of activists with *Higher* and *Lower* reputation and also report the *p*-value for differences between them. Consistent with Krishnan, et al., we find that underfunding is more pronounced for firms targeted by high reputation HF activists.

5. Channels

Having shown deterioration in employee pension funding following HF activism, we next try to identify the mechanisms underlying this effect. How does a pension plan of a target company become underfunded? We next examine several possible channels through which underfunding can take place. These are reductions in employer contributions, increases in assumed rates of returns on plan investments, and increases in discount rates used to compute the present value of

plan liabilities. We also examine whether pension funds tilt asset allocation to riskier assets to deal with underfunding and whether such a tilt leads to better investment performance.

5.1 Employer contribution

One possible explanation for the increase in underfunding after HF activism is that firms reduce employer contributions to the plans to reduce costs and increase profits. This possibility is consistent with the example of Timken Corporation. To test whether underfunding results from reduced employer contributions, we re-estimate the DiD regressions in Table 3 after replacing the dependent variable with the natural logarithm of employer contribution in $ millions. We control for the number of employees and include other control variables similar to those in Table 3. Table 4 reports the results. Consistent with our conjecture, target firms significantly reduce employer contributions to employee pension plans after being targeted by HF activists. Our marginal effects indicate that employer contributions drop by about 16% to 26% relative to their previous levels. This evidence confirms that employee pension plans suffer from underfunding due to reduced employer contributions to the plans.

5.2 Assumed rate of returns on plan investments

We next examine whether firms start making more optimistic assumptions about the anticipated rates of returns on pension plan assets in order to justify reducing employer contributions to the plans. So we re-estimate the DiD regression in Table 3 after replacing the dependent variable with *PPROR*, the anticipated long-term rate of return on plan assets. Row 1 of Table 5 shows that the coefficient of the interaction variable *Target*Post* is positive but marginally significant, suggesting that after being targeted, firms tend to increase their assumed rates of return

on pension investment. The last three rows of the table show that the magnitude of this effect is about 1.7% to 2.7% of the mean assumed return of 7.2% to 7.6%.[8]

5.3 Asset allocation

Next, we examine whether HF activism affects asset allocation decisions of pension plans because pension funding and asset allocation are closely intertwined. First, funding decisions often determine asset allocation decisions. For example, underfunded plans may be more inclined to invest in risky assets to earn their way out of underfunding. Second, asset allocation decisions can affect funding levels. For example, a good year for the stock market can reduce the level of future contributions needed to maintain plan health for some time. Third, stockholders are inclined to tilt pension portfolios towards high-risk, high-return assets, to provide pension benefits more efficiently and cheaply. Whether such a tilt happens and whether it leads to improved asset performance in terms of actual returns (not alpha) are both empirical questions. We use the DiD approach, replacing the dependent variable in Table 3 regressions with asset allocation to equity, *%Equity*, which measures the percentage of pension assets allocated to equity. Table 6 reports the results. There is some evidence that targeted firms tend to invest more in risky assets such as equity. The coefficient of the DiD term, *Target*Post*, is positive but marginally significant under one specification. The last three rows in the table show that the magnitude of this effect is about

[8] Our regression specification of assumed rate of return is consistent with Bergstresser, Desai, and Rauh (2006), who find that the assumed rate of return for a firm does not change significantly over time.

2.1% of plan assets or about 4% of the mean equity allocation of 53.2%. This result provides modest support to the view that shareholders prefer riskier investment of pension plan assets. After being targeted by HF activists, target firms tend to take somewhat more risk in pension plans.[9]

5.4 Fund performance

The next obvious question is that whether this risky investment results in higher performance of plan assets. Although sponsors' contributions to plans do not keep up with additional benefit accruals year-after-year, if pension plans perform better due to risky investment, pension plan funding levels would not be compromised. We use the DiD approach, replacing the dependent variables with pension asset return, *Return*, which measures the actual return on plan assets. Table 7 shows that after being targeted by activists, the firm does not experience greater returns on its pension assets. The coefficient of the interaction term, *Target*Post*, is statistically insignificant under various specifications.

5.5 Discount rate

We next examine whether firms targeted by HF activists increase the discount rates to reduce the present values of pension plan liabilities, as Andonov, Bauer and Cremers (2017) find for more underfunded U.S. public pension funds. On the other hand, Stefanescu, Wang, Xie and Yang (2018) find that large U.S. companies *lower* pension plan discount rates for top executives before they retire with a lump-sum benefit distribution. We use the DiD approach, replacing the

[9] The *t*-statistics are small in this test possibly due to limited availability of data. Compustat data on asset allocations became available starting in 2003, when SFAS 132(R) became effective.

dependent variables with the *Discountrate* assumed by the pension plan. Table 8 shows that after being targeted by activists, firms increase the pension discount rate used to compute the present value of pension liabilities and the coefficient estimate of this increase is statistically significant. In the last three rows, the size of the marginal effect is 0.17 percentage points or about 3.2% of the mean discount rate of 5.4%.

5.6 Plan freezing and termination

Finally, as Cocco (2014) argues, firms are more likely to freeze underfunded plans and terminate overfunded plans. After a freeze, employees no longer accrue pension benefits from their future service, which results in a loss of wealth to employees (see, e.g., Comprix and Muller, 2011; Choy, Lin and Officer, 2014; Rauh, Stefanescu and Zeldes, 2016). On the other hand, firms terminate overfunded plans to avoid having to make future contributions to them. Given that plan underfunding increases following HF activism, we examine whether plan freezing becomes more likely and plan termination becomes less likely. We obtain freezing and termination status for our sample from the IRS database. However, over our sample period, there are just 10 frozen plans and no terminated plans among targets and matched firms, which does not allow any meaningful analysis.

6. Underlying Mechanisms

6.1 M&A or governance pressure

Do targets increase underfunding in response to M&A or governance-related pressure by activists? Using the Item 4 of Schedule 13D filings, we identify the purpose of transaction based

on the Audit Analytics classification. The variable, *M&A,* equals 'yes,' if the activism is about a merger or acquisition of or by the firm, 'no' otherwise. Governance equals 'yes' if the activism concerns a governance issue, and 'no' otherwise. Activism is about M&A for 77 unique targets and governance for 398 targets. Column (1) ((2)) of Table 9 shows estimates of separate regressions similar to those in column (3) of Table 3 for subgroups of targets partitioned by whether the activism was M&A (governance) related. The dependent variable is *Underfund*. The table shows that underfunding increases significantly only in firms targeted by activists for M&A or governance reasons. The magnitude of the difference in the marginal effect on underfunding between the subgroups is remarkable. For firms targeted for M&A (governance) reasons, underfunding increases by about 40.9% (24.1%) relative to the mean underfunding level, compared to about 6.8% (7.6%) for the rest of the sample. The *p*-value of the difference in the coefficients of *Target*Post* between the two samples is 0.03 in column (1) and 0.01 in column (2). These findings support the idea that managers of target firms increase underfunding in response to M&A or governance-related pressure by activists.

6.2 Wealth transfer from employees

Finally, we conduct a direct test of the wealth transfer hypothesis that underfunding of pension plans represents a wealth transfer from employees to shareholders. In efficient markets, the stock price reaction to the announcement of HF activism represents investors' best estimate of the effect of activism on stockholders' wealth. If investor expectations of future pension underfunding explain shareholder wealth gains upon activism announcement, that would suggest wealth transfer from employee pensions to shareholders. We control for the effect of activism on

bondholder wealth in this analysis, given Klein and Zur's (2011) finding that HF activism reduces bondholder wealth.

We start by computing the abnormal stock return on day t as $AR_{it} = r_{it} - r_{mt}$, where r_{it} and r_{mt} are the day t returns on stock i and the CRSP value-weighted market index. We then compute *CAR (-10,+10)*, the cumulative abnormal return surrounding the activism announcement date (day 0) as the sum of AR_{it} over days -10 to +10. We also compute *BHAR(-10,+10)*, the buy-and-hold abnormal return as the product of $(1+AR_{it})$ over days -10 to +10, minus one. *CAR (-10,+10)* and *BHAR(-10,+10)* are our alternate measures of the wealth gain to shareholders from activism. We next compute excess pension underfunding, *Excess_Underfund*, as the difference between the percentage future pension underfunding for a target and its matched control, averaged over years (+1, +2) relative to the activism year 0.[10]

To compute excess bond returns, we start by matching each publicly traded bond in our target sample to a publicly traded bond in our control sample from section 3.3 that has the same numerical rating (on a scale of 1 to 23; see Appendix A) and the same maturity in years in the activism announcement year (year 0). However, this procedure yields a control bond for only 20 or our target firms, which is insufficient for any meaningful statistical analysis. So, we expand our search for control bonds using the same criteria to all firms on Compustat in year 0 that did not become a target of HF activism during our sample period. Some firms have no publicly traded bonds, while others have one or more such bonds. For targets that have multiple traded bonds, we consider all of them to take into account the effect of activism on different bonds, and use standard

[10] Our results are similar when we use excess underfunding averaged over years (+1, +5), instead of (+1, +2).

errors clustered at the firm-level. The bond return data come from WRDS Corporate Bond Database. We use monthly bond returns calculated based on the last price at which a bond was traded in a given month and accrued coupon interest. *Short_excess_bond* equals the difference between the month 0 (i.e., the activism announcement month) return for the target and control bonds. *Long_excess_bond* equals the difference in the buy and hold return between the target and control bonds over months (+1, +12), computed as $[(1+R_1).(1+R_2)\ldots(1+R_{12}) - 1]$. For calculating *Long_excess_bond*, we require a non-missing return observation over month 0 and at least one non-missing return observation over months (+10,+12) for both the target and control bonds.[11]

We next estimate cross-sectional regressions of the percentage gain to target shareholders from HF activism. The main explanatory variables of interest are *Excess_underfund* and *Short_excess_bond* or *Long_excess_bond*. We use a set of control variables similar to Klein and Zur (2011). The regressions include binary dummy variables for the year of activism and industry (2-digit SIC) to control for potential time-trends and industry effects in activism. The sample

[11] As discussed by many prior studies (see, e.g., Klein and Zur (2011)), corporate bonds trade sporadically, so some monthly return observations can be missing for a bond. Ideally, to compute the buy and hold bond return over months (+1, +12), we need the bond to have a price at the end of months 0 and +12. Given that bond returns are reported at a monthly frequency in the database, our procedure of requiring a non-missing bond return for month 0 and at least one return over months (+10, +12) means that there is a price at the end of month 0 and at least one price between the ends of months (+10, +12), which allows us to compute the return for most of the year, while keeping data requirements reasonable and therefore sample size reasonably large.

period for this analysis is 2002-2014 because the bond return database starts in 2002. Our sample consists of 848 bonds in 102 unique target firms for which we have complete data for the regressions. For long-run bond returns, our final sample has 663 bonds in 90 unique targets. The unit of observation in this analysis is a bond issued by a target firm.

In Table 10, the coefficient estimates of *Excess_underfund* are positive and statistically significant in regressions of both CAR and BHAR in various specifications, suggesting that the stock price reaction to activism announcement is partly in anticipation of upcoming reductions in employee pension funding levels.[12] The coefficient estimates of *Excess_underfund* range from 0.065 to 0.078 in the regressions of %CAR(-10, +10) and %BHAR(-10, +10), which implies that in firms with DB pension plans, roughly 7% of the wealth gains to shareholders at activism announcement come from underfunding of employee pensions.[13] The coefficients of both *Short_excess_bond* and *Long_excess_bond* are statistically insignificant, which implies that there is no evidence of a wealth transfer from bondholders to shareholders in our setting of firms with defined benefit pension plans that become targets of HF activists.

[12] Our untabulated results are similar if we exclude the bond return variables from the regressions.

[13] Do target firms increase dividend payment to shareholders while employees suffer from pension underfunding? Our untabulated results support this idea because the dollar value of common dividends increases in the dollar value of pension underfunding.

7. Identification and Robustness

Section 4 shows clear evidence of deterioration in the health of employee pension funds after HF activists target a firm. These results are consistent with our main hypothesis that firms targeted by HF activists transfer wealth from employees to shareholders. However, these findings are also consistent with two other possibilities. First, instead of activism causing pension underfunding, both activism and underfunding may be related via some omitted variables. Second, the selection of target firms by HF activists is obviously not random. Our baseline tests address these concerns by using matching method to control for observable attributes of target firms that may attract HF activists. Accordingly, we match each target firm with a control firm, and then draw inferences using a DiD approach. Moreover, we control for time-invariant firm characteristics, both observable and unobservable, by including firm fixed effects in our baseline regressions. Nonetheless, there is a residual concern that some time-varying unobservable factors drive reductions in employee pension funding after activism episodes.

We address this concern in three additional ways. First, in section 5, we examine several channels underlying our underfunding results. We find that target firms reduce employer contributions to the pension plans (Table 4), increase the assumed rates of return on plan assets (Table 5), and tilt the allocation of plan assets toward riskier investments (Table 6), in a failed attempt at boosting plan performance (Table 7). Target firms also increase the discount rate they use to make the present value of plan liabilities appear lower (Table 8). Second, in section 6, we show that underfunding increases more in target firms under M&A or governance pressure by activists (Table 9) and present some direct evidence of wealth transfers from employees to shareholders (Table 10). Finally, we test five alternate interpretations of our findings. As discussed

in section 7.1 below, none of these alternative explanations hold up to empirical scrutiny, leaving our interpretation as the most likely one.

7.1 Alternative explanations

7.1.1 Stock picking skill of hedge funds

Our first test is designed to address the stock picking skill of HFs. Activists are skilled at picking stocks with improving prospects even if they remain passive shareholders. Borrowing the approach of Kim, Kim and Kwon (2009), Brav, Jiang and Kim (2015a), and Aslan and Kumar (2016), we examine the effect of HF activism on underfunding when the HF switches from being a passive, 13G filer, to being an active, 13D filer. If our results are merely driven by the activist's stock picking skill, this switch should have no effect on pension underfunding because both 13G and 13D filings indicate the same stock picking skill that led to the purchase of a 5% stake in the firm.

We begin with all 13D and 13G filings made by any of the 210 activist HFs in our sample, i.e., HFs that filed at least one 13D at a firm in our sample during our sample period. We then identify 13G and 13D filers for each target firm in a given year. The observation thus is at the target-activist-year level. A G→D Switcher equals one, if the previous filing by a given activist HF targeting a given company was a 13G and its current filing is a 13D.

We find 145 cases in our sample where the filer switched from a 13G to a 13D. We then re-estimate our baseline regression in column (1) of Table 3 after adding an interaction variable, G→D Switcher*Post. Column (1) of Table 11 shows the result. We find a significant positive effect on underfunding of target firms in the two years after an activist switches its filing from 13G to

13D. This finding does not support the idea that the impact of HF activism on pension underfunding is merely due to the activist's stock picking skill.

7.1.2 Mean-reversion in pension funding

Our second test examines the possibility that our results merely pick up mean-reversion in pension funding by target firms. Pension funding may decrease after intervention simply due to mean-reversion because it increased before the intervention. We set up a placebo test wherein we define a pseudo-event year and examine the targets' response to this pseudo-event. The pseudo-event is defined as five years before the true activism event year. We examine the effect of HF activism on underfunding when target firms experience this pseudo-event. We expect a significantly positive effect after the pseudo-event if our results are merely picking some existing trends. Column (2) of Table 11, however, shows an insignificant coefficient on the DiD term. This result does not support the idea that the changes in pension underfunding that we observe after activism are simply an artifact of mean-reversion.

7.1.3 Voluntary reforms by target managements

Our third test investigates the possibility of voluntary reform by the management of the target firm. This alternative hypothesis suggests that target firms voluntarily reduce their funding of employee pension plans without any pressure from a HF. Hard activism, a hostile approach, involves disputes between shareholder activists and target management due to management's resistance to the activist's agenda (see, e.g., Boyson and Pichler, 2018). So for hard activism events, it is difficult to attribute any changes to voluntary reforms by management because we know that management in these cases resisted the actions demanded by activists (see Brav, Jiang

and Kim, 2015a). Therefore, hard activism rules out the possibility of voluntary reforms by management. If we find underfunding of pension plans after hard activism, we can safely conclude that the change was not voluntary.

To examine this possibility, we classify activists' approaches based on their stated tactics in 13D filings. While our full sample includes a range of tactics employed by activists, here we focus on just hard tactics, which reduces the sample size in this test. Specifically, hard activism includes cases where activists (1) express their concerns about targets, (2) dispute with targets, or (3) try to control targets. By contrast, the rest of the targets experience soft activism, a non-hostile approach where an activist communicates with management. So we next examine our subsample of hard activism events only and redo the DiD approach. The voluntary reforms story implies that the coefficient of this interaction term should be zero. But column (3) of Table 11 shows a significantly positive coefficient on this interaction term, implying that targets are more likely to experience underfunding when the pressure from activist shareholders is strong. This finding supports the hypothesis that the underfunding of target firms is due to pressure from HF activists rather than voluntary reforms by target firms.

7.1.4 Attrition bias

Our fourth test addresses a potential attrition bias that can affect firms targeted by HF activists. Specifically, targets that delist after activism may drive our results. Boyson, Gantchev and Shivdasani (2017) find that target firms are more likely to be sold after HF activism. Pension underfunding can also be a firm's response to financial distress (see Duan, Hotchkiss and Jiao, 2015), which can lead to delisting. To address this concern about our main hypothesis, we re-estimate the DiD regression in Table 3 after eliminating firms that delist within two years of the

onset of activism. In column (4) of Table 11, our results continue to hold, negating the idea that pension underfunding can be explained by the delisting of target firms after activism.

7.1.5 Financial distress

Our final test addresses the possibility that firms targeted by activists are more likely to be financially distressed and reduce pension funding in response (see, e.g., Duan, Hotchkiss and Jiao, 2015). To examine this possibility, we compute Altman's Z score for each of our sample firms and interact it with our DiD variable, *Target*Post*. Altman's Z score measures a firm's financial strength; it is an inverse measure of the probability of bankruptcy of a firm. Column (5) of Table 11 shows that the effect of activism on underfunding is actually stronger when firms are financially healthier. This finding does not support the idea that pension underfunding is target firms' response to financial distress.

7.2 Long-run effects of activism

We next explore whether the pension underfunding we observe over two year following activism continues over the long-run. We redo our DiD specification as in column (3) of Table 3, column (4) of Table 4, and column (4) of Table 8, and replace *Post* with *Post5*, which equal one for years [t+1, t+5], and zero for years [t-1, t-5], where t is the year of onset of activism. Table 12 shows that the effect of activism on underfunding continues over five years following activism. The size of the marginal effect is 3 percentage points or about 17% of the mean underfunding rate of 18%. The underlying channel appears to be an increase in the discount rate that target firms assume when calculating the present value of pension obligations. The marginal effect here is 0.165 percentage points or about 2.9% of the mean discount rate of 5.7%.

8. Defined Contribution Plans

Our data source on employee pension plans thus far is Compustat Pension files, which do not have data on defined contribution (DC) plans and labor unions. In this section, we obtain this data from the IRS Pension Research File. Our IRS sample contains all DC plans over 2000-2014. We first merge IRS data with Compustat annual files using employer-identification number (EIN) and supplement it by matching with company name. So, our IRS sample contains firms in the Compustat universe. We then identify whether HF activists target a firm during 2001-2014 and do a PSM matching as described in Section 3.3. Using the target and matched non-target sample, we estimate a DiD regression in which the dependent variable is the natural logarithm of employer contributions to DC plans. Our key independent variable is *Target*Post5*, where *Target* equals one for targets of activism, and zero otherwise, and *Post5* equals one for years [t+1, t+5], and zero for years [t-1, t-5]. Table 13 shows that targets decrease their dollar contribution to DC plans after being targeted. The decrease is statistically significant in the first two specifications. The size of the marginal effect varies between -$0.5 million to -0.8 million in various specifications, or a whopping 31% to 48% of the mean employer contribution.

Finally, we examine the role of labor unions in our setting. We divide our DC sample into two groups: firms with labor unions and firms without labor unions. We classify a firm as unionized in a given year if at least one of its pension plans is collectively bargained during the year. We then redo the DiD analysis of Table 13 and present the results in Table 14. We find that the effect of activism on employer contributions (see the coefficient estimates of the DiD term) is substantially more pronounced in non-unionized firms than in unionized firms. However, the difference in coefficients between the two subsamples is statistically insignificant.

9. Conclusion

Shareholder gains from activism can come from wealth transfers from workers. Existing empirical evidence in support of this hypothesis is quite limited. Specifically, there is no prior evidence that employee pensions suffer from HF activism. In this paper, we attempt to fill this gap by comparing the funding levels of pension plans before and after HF activism. We find that on average, DB employee pension plans of target firms suffer from underfunding after the activism episode. This effect appears to be due to reduced employer contributions to the pension plans, which firms justify by increasing the assumed rate of return on plan investments and the discount rate used to compute the present value of plan obligations. While targeted firms take more risk when investing pension plan assets, the plans show no corresponding increases in their realized returns. Activists typically exit the firm after 1.5 to 2 years, but the effect on employee pensions is longer-term and persists over at least the next five years. While most of our paper deals with defined benefit pension plans, about which there is more information, we also find that target firms reduce employer contributions in defined contribution plans.

We present evidence that suggests that the underfunding appears to be due to M&A or governance pressure applied by activists. About seven percent of the wealth gains to shareholders at activism announcement in firms with DB plans come from underfunding of employee pensions. We find no empirical support for several alternative hypotheses such as activists' stock-picking skills, voluntary changes adopted by management, mean-reversion, financial distress, and attrition bias, which leaves wealth transfer from employees as the most likely explanation.

Overall, the paper extends the literature showing that HF activism transfers wealth from other stakeholders to shareholders (see, e.g., Klein and Zur, 2011; Brav, Jiang and Kim, 2015; and

Feng, Xu and Zhu, 2016). Our empirical results point to a negative effect of HF activism on workers' welfare. Finally, our findings have important implications for public guarantees and regulation of private pension plans.

References

Amir, E., & Gordon, E. A. (1996). Firms' choice of estimation parameters: Empirical evidence from SFAS No. 106. *Journal of Accounting, Auditing and Finance*, 11(3), 427-448.

Anantharaman, D., & Lee, Y. G. (2014). Managerial risk taking incentives and corporate pension policy. *Journal of Financial Economics*, 111(2), 328-351.

Andonov, A., Bauer, R., & Cremers, M. (2017). Pension fund asset allocation and liability discount rates. *Review of Financial Studies*, 30(8), 2555–2595.

Aslan, H., & Kumar, P. (2016). The product market effects of hedge fund activism. *Journal of Financial Economics*, 119(1), 226-248

Aslan, H., & Maraachlian, H. (2009). Wealth effects of hedge fund activism. Working Paper.

Asthana, S. (1999). Determinants of funding strategies and actuarial choices for defined-benefit pension plans. *Contemporary Accounting Research*, 16(1), 39-74.

Bae, K. H., Baik, B., & Kim, J. M. (2011). Do hedge funds have information advantages? Evidence from hedge fund stock holdings. Working Paper.

Bean, D. F., & Bernardi, R. A. (2000). Underfunding pension obligations while paying dividends: Evidence of risk transfers. *Critical Perspectives on Accounting*, 11(5), 515-530.

Bergstresser, D., Desai, M., & Rauh, J. (2006). Earnings manipulation, pension assumptions, and managerial investment decisions. *Quarterly Journal of Economics*, 157-195.

Black, F. (1980). The tax consequences of long-run pension policy. *Financial Analysts Journal*, 36(4), 21-28.

Boyson, N., Gantchev N., & Shivdasani, A. (2017). Activism mergers. *Journal of Financial Economics*, 126(1), 54-73.

Boyson, N. M., & Pichler, P. (2018). Hostile resistance to hedge fund activism. *Review of Financial Studies,* 32(2), 771-817.

Brav, A., Dasgupta, A. and Mathews, R. D., Wolf Pack Activism (2019). Working Paper, SSRN.

Brav, A., Jiang, W., & Kim, H. (2009). Hedge fund activism: A review. *Foundations and Trends in Finance*, 4(3), 185-246.

Brav, A., Jiang, W., & Kim, H. (2015a). The real effects of hedge fund activism: Productivity, asset allocation, and labor outcomes. *Review of Financial Studies* 28 (10), 2723–2769.

Brav, A., Jiang, W., & Kim, H. (2015b). Recent advances in research on hedge fund activism: Value creation and identification. *Annual Review of Financial Economics* 7, 579-595.

Brav, A., Jiang, W., Ma, S. & Tian, X. (2018). How does hedge fund activism reshape corporate innovation? *Journal of Financial Economics*, 130(2), 237-264.

Brav, A., Jiang, W., Partnoy, F., & Thomas, R. (2008). Hedge fund activism, corporate governance, and firm performance. *Journal of Finance*, 63(4), 1729-1775.

Choy, H., Lin, J., & Officer, M. S. (2014). Does freezing a defined benefit pension plan affect firm risk? *Journal of Accounting and Economics*, 57(1), 1-21.

Cocco, J. F., & Volpin, P. F. (2007). Corporate governance of pension plans: the UK Evidence. *Financial Analysts Journal*, 63(1), 70-83.

Cocco, Joao F. (2014). Corporate Pension Plans. *Annual Review of Financial Economics*, Vol. 6, pp. 163-184.

Coffee, J. C., & Palia, D. (2016). The wolf at the door: The impact of hedge fund activism on corporate governance. *Annals of Corporate Governance*, 1(1), 1-94.

Comprix, J., & Muller, K. (2011). Pension plan accounting estimates and the freezing of defined benefit pension plans. *Journal of Accounting and Economics*, 51 (1-2), 115-133.

Coronado, J., & Liang, N. (2005). The influence of PBGC insurance on pension fund finances. *Restructuring Retirement Risks*, 88-108.

Denes, M. Karpoff, J. and McWilliams, V. (2017). Thirty years of shareholder activism: A survey of empirical research. *Journal of Corporate Finance*, 44, 405-424.

Duan, Y., Hotchkiss, E. S., & Jiao, Y. (2015). Corporate pensions and financial distress. Working Paper.

Edmans, A., & Holderness, C. G. (2016). Blockholders: A survey of theory and evidence. In B. Hermalin and M. Weisbach, eds., *Handbook of Corporate Governance*.

Feng, F. Z., Q. Xu, and H. Zhu. (2016) Caught in the Cross-fire: How the threat of hedge fund activism affects creditors. Working Paper, University of Oklahoma.

Frank, M. M. (2002). The impact of taxes on corporate defined benefit plan asset allocation. *Journal of Accounting Research*, 40(4), 1163-1190.

Gantchev, N. and Jotikasthira, C. (2017). Institutional trading and hedge fund activism, *Management Science*, 64(6), 2930-2950.

Gillan, S. L. and Starks, L. T. (2007). The evolution of shareholder activism in the United States. *Journal of Applied Corporate Finance* 19, 55–73.

Graham, J. R., & Mills, L. F. (2008). Using tax return data to simulate corporate marginal tax rates. *Journal of Accounting and Economics*, 46(2), 366-388.

Grennan, J. A. (2014). A corporate culture channel: How increased shareholder governance reduces firm value. Working Paper, SSRN.

Harper, J. T., & Treanor, S. D. (2014). Pension conversion, termination, and wealth transfers. *Journal of Risk and Insurance*, 81(1), 177-198.

Huang, J. (2009). Hedge funds and shareholder wealth gains in leveraged buyouts. Working Paper.

Jiang, W., Li, K., & Wang, W. (2012). Hedge funds and Chapter 11. *Journal of Finance*, 67(2), 513-560.

Jiang, W., Li, T., & Mei, D. (2018). Influencing control: Jawboning in risk arbitrage. *Journal of Finance*, 73(6), 2635-2675.

Kieso, D. E., Weygandt, J. J., & Warfield, T. D. (2010). Intermediate accounting: IFRS edition (Vol. 2). John Wiley & Sons.

Kim, W., Kim, W., & Kwon, K. S. (2009). Value of outside blockholder activism: Evidence from the switchers. *Journal of Corporate Finance*, 15(4), 505-522.

Klein, A., & Zur, E. (2011). The impact of hedge fund activism on the target firm's existing bondholders. *Review of Financial Studies*, 24(5), 1735–1771.

Krishnan, C. N. V., Partnoy, F., & Thomas, R. S. (2016). The second wave of hedge fund activism: The importance of reputation, clout, and expertise. *Journal of Corporate Finance*, 40, 296-314.

Petersen, M. A. (1992). Pension reversions and worker-stockholder wealth transfers. *Quarterly Journal of Economics*, 1033-1056.

Phan, H. V., & Hegde, S. P. (2013). Pension contributions and firm performance: Evidence from frozen defined benefit plans. *Financial Management*, 42(2), 373-411.

Pontiff, J., Shleifer, A., & Weisbach, M. S. (1990). Reversions of excess pension assets after takeovers. *Rand Journal of Economics*, 600-613.

Rauh, J. D. (2006). Investment and financing constraints: Evidence from the funding of corporate pension plans. *Journal of Finance*, 61(1), 33-71.

Rauh, J. D. (2009). Risk shifting versus risk management: Investment policy in corporate pension plans. *Review of Financial Studies*, 22(7), 2687-2733.

Rauh, J. D., Stefanescu, I., & Zeldes, S. P. (2016). Cost saving and the freezing of corporate pension plans. Working Paper.

Rosett, J. G. (1990). Do union wealth concessions explain takeover premiums? The evidence on contract wages. *Journal of Financial Economics*, 27(1), 263-282.

Sharpe, W. F. (1976). Corporate pension funding policy. *Journal of Financial Economics*, 3(3), 183-193.

Sharpe, W. F., & Treynor, J. L. (1977). The principles of corporate pension finance. *Journal of Finance*, 32(2), 627-638.

Shleifer, A., & Summers, L. H. (1988). Breach of trust in hostile takeovers. In *Corporate Takeovers: Causes and consequences*, University of Chicago Press, 33-68.

Stefanescu, I., Wang, Y., Xie, K., & Yang, J. (2018). Pay me now (and later): Pension benefit manipulation before plan freezes and executive retirement. *Journal of Financial Economics*, 127 (1), 152-173.

Stein, J. C. (1988). Takeover threats and managerial myopia. *Journal of Political Economy*, 96(1), 61-80.

Sundaresan, S., & Zapatero, F. (1997). Valuation, optimal asset allocation and retirement incentives of pension plans. *Review of Financial Studies*, 10(3), 631-660.

Sunder, J., Sunder, S. V., & Wongsunwai, W. (2014). Debtholder responses to shareholder activism: Evidence from hedge fund interventions. *Review of Financial Studies*, 27(11), 3318-3342.

Thomas, J. K. (1988). Corporate taxes and defined benefit pension plans. *Journal of Accounting and Economics*, 10(3), 199-237.

Uchida, K., & Xu, P. (2008). US barbarians at the Japan gate: Cross-border hedge fund activism. Working Paper.

United States Government Accountability Office. (2017). High risk: PBGC insurance programs, GAO report # 17-317.

Figure 1

Parallel Trends

The figure plots mean underfunding rates between target firms and their matched control firms using the propensity score matching (PSM) procedures as described in Table 2. Time 0 is the activism event year.

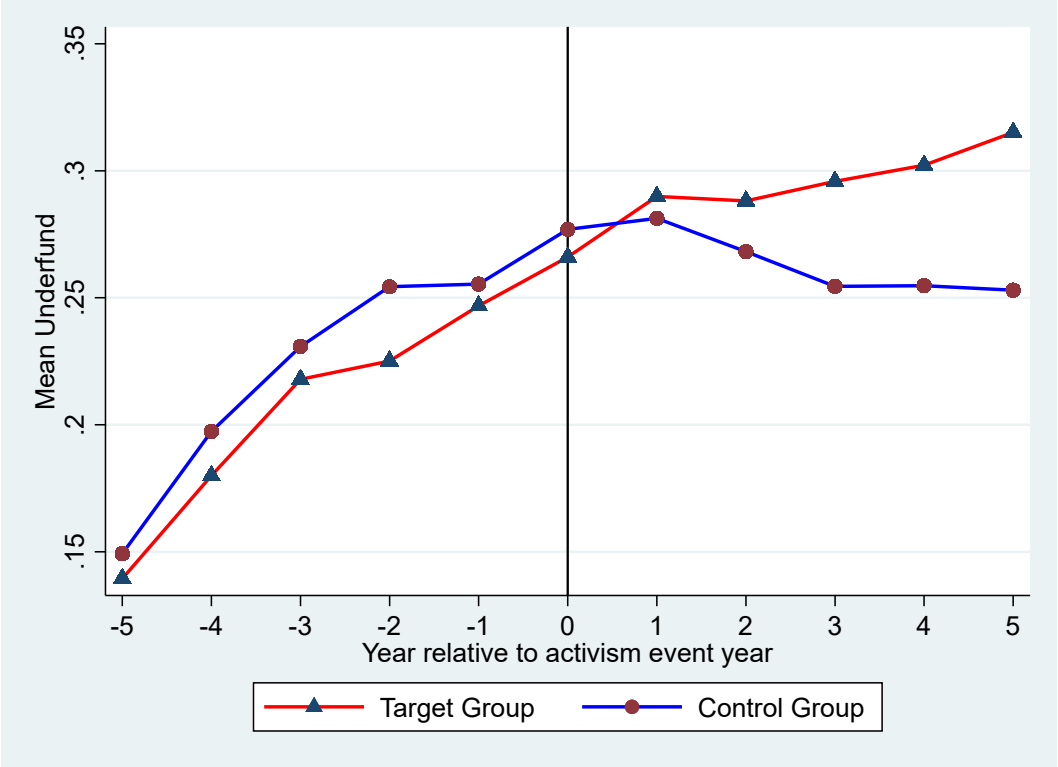

Table 1

Hedge fund activism

The table shows the number of HF activism events by year and by Fama-French 12 industry. An HF activism event represents a 13D filing by a hedge fund. When a person or investor group acquires beneficial ownership of 5% or more of a voting class of a company's securities and intends to change or influence control of the firm, they are required to file a 13D with the SEC within 10 days of acquiring the stake. The sample consists of 544 activism events during 2001-2014 for which data on funding levels of defined benefit pension plans of target firms is available on Compustat Pension annual data files.

Year	Freq.	Percent		Fama-French 12 industries	Freq.	Percent
2001	36	6.62				
2002	32	5.88	1	Consumer NonDurables	44	8.09
2003	38	6.99	2	Consumer Durables	25	4.6
2004	34	6.25	3	Other Manufacturing	100	18.38
2005	42	7.72	4	Energy	21	3.86
2006	55	10.11	5	Chemicals and Allied Products	23	4.23
2007	56	10.29	6	Business Equipment	66	12.13
2008	58	10.66	7	Telephone and Television Transmission	19	3.49
2009	29	5.33	8	Utilities	23	4.23
2010	27	4.96	9	Wholesale, Retail, and Some Services	50	9.19
2011	44	8.09	10	Healthcare, Medical Equipment, and Drug	32	5.88
2012	36	6.62	11	Finance	86	15.81
2013	24	4.41	12	Others	55	10.11
2014	33	6.07				
Total	544	100		Total	544	100

Table 2

Mean and median values for target and control samples in year -1

The table shows characteristics of target and control firms one year prior to the year of the activism event. We match each target firm to a non-target firm on Compustat from the same year and same 2-digit SIC industry using the propensity score matching (PSM) method. We require that the control firm not be targeted by an activist hedge fund during our sample period. For each target, we pick a control firm in its 2-digit SIC industry that has the closest propensity score to the target that year. Matching is based on lag 1 of the following variables: Tobin's Q, leverage, ROA, and log of market value. For each variable, we report the mean (median) values for the target and control samples, and t-statistics (p-value of the Wilcoxon test) of the differences between them. Underfund is (Projected Benefit Obligation - Pension Plan Assets)/ Projected Benefit Obligation. In Panel B, the n-year growth rate in Underfund is defined as [(Underfund$_{-1}$/ Underfund$_{-1-n}$) – 1]. Panel C presents tests of the parallel trends assumption in a multivariate setting. Appendix A defines the variables. The number of observations of one-year lagged variables range from 274 to 544.

Variable	Panel A Mean			Median		
	Target	Control	t-stat for difference	Target	Control	Wilcoxon test p-value
Pension characteristics:						
Underfund	0.24	0.25	-0.13	0.24	0.22	0.90
Contribution	1.41	1.21	1.23	1.39	1.24	0.17
PPROR	7.44	7.09	2.19	8.00	8.00	0.17
%Equity	55.51	53.17	1.32	60.80	60.00	0.24
Return*100	1.74	4.86	-0.97	7.92	7.93	0.90
Discountrate	5.62	5.37	2.17	5.75	5.75	0.08
lnFVPA	3.91	3.67	1.48	4.11	3.67	0.10
OCF	0.06	0.06	-0.26	0.07	0.07	0.72

Std_OCF	0.04	0.05	-0.88	0.03	0.03	0.99
Duration	0.30	0.33	-1.63	0.31	0.33	0.05
Taxrate	0.26	0.26	0.03	0.31	0.32	1.00
Firm characteristics:						
ROA	0.09	0.09	0.12	0.10	0.10	0.72
TDA	0.25	0.25	0.22	0.22	0.24	0.97
lnMV	6.25	6.27	-0.15	6.28	6.27	0.83
MB	1.46	1.51	-0.91	1.23	1.25	0.22
lnAge	2.94	2.82	2.46	3.00	2.83	0.00
Emp (in thousands)	10.61	13.13	-1.27	2.80	2.20	0.36
ΔMF×100	0.05	0.16	-1.14	0.03	0.02	0.14
ΔROA(-3,-1)	0.02	0.01	0.77	0.00	0.00	0.37
ΔMB(-3,-1)	0.06	0.00	0.13	0.01	0.00	0.54
HHI	0.08	0.08	0.03	0.05	0.05	0.81
ANALYSTS	1.18	1.17	0.16	1.10	1.10	0.99
INSTITUTION	0.48	0.42	2.32	0.51	0.38	0.02
CASH	0.12	0.12	0.02	0.07	0.06	0.47
%Assets_from_NewEquity	-0.02	0.00	-1.59	0.00	0.00	0.79
Altman Z	2.95	2.98	-0.09	2.43	2.63	0.13

Panel B: Tests of parallel trends assumption

Underfund 1-year growth	-0.81	-0.14	-1.43	-0.07	-0.07	0.61
Underfund 2-year growth	1.35	-0.07	0.66	-0.16	-0.15	0.65

Panel C: Tests of parallel trends assumption in multivariate setting

	(1) Target	(2) Target
Underfund 1-year growth	-0.037	
	(-0.88)	
Underfund 2-year growth		-0.061
		(-1.43)
Firm and plan controls	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
N	4230	3856
R^2	0.079	0.089

Table 3

Underfunding of defined benefit pension plans after hedge fund activism

The table presents estimates from panel regressions of pension underfunding. The sample includes firms targeted by HF activists and their matched control firms as described in Table 2. We use the following difference-in-differences specification:

$$y_{i,t} = \alpha_0 + \alpha_1 Post_{i,t} + \alpha_2 Target_i \times Post_{i,t} + \underline{\alpha_3} Control_{i,t} + \underline{\alpha_4} Year_t + \underline{\alpha_5} Firm_i + \varepsilon_{i,t}$$

where the dependent variable measures underfunding of firm i in year t. The dependent variable is Underfund = (Projected Benefit Obligation - Pension Plan Assets)/ Projected Benefit Obligation. *Target* equals one if firm i is a target of activism; it equals zero otherwise. *Post* equals one if the firm-year (*i*,*t*) observation is within [*t+1*, *t+2*] years of an activism event or a pseudo-event; it equals zero for years [*t-1*, *t-2*]. *Control* is a vector of firm i's controls. The regressions include year and firm fixed effects. In Panel B, we show regression results for two equal sub-periods of our sample and the *p*-value of *t*-statistic for the difference between them. In Panel C, we measure activist reputation using the three measures proposed by Krishnan, Partnoy and Thomas (2016): *Most active hedge funds*, *Top investor hedge funds*, and *Top return hedge funds*. *Most active HF* is an indicator that equals 1 for HFs with at least 5 active interventions (via Discuss, Dispute, Concern or Control as described in Appendix B) during the most recent 3-year period, and 0 otherwise. *Top investor HF* is an indicator that equals 1 for HFs in the top 10 league table of aggregate dollar investments during the most recent 3-year period, and 0 otherwise. *Top return HF* is an indicator that equals 1 for hedge funds with an average 21-day announcement period abnormal returns to targets of at least 10%, and 0 otherwise. Activists that fall into at least one high reputation group are 'higher reputation activists,' while the remaining are 'lower reputation activists.'

Appendix A defines other variables. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The row above sample size (N) shows whether and how the standard errors are clustered.

Panel A: Baseline results

	(1) Underfund	(2) Underfund	(3) Underfund
Target*Post	0.024***	0.024**	0.024**
	(2.87)	(2.06)	(2.03)
Post	0.001	0.001	0.001
	(0.11)	(0.12)	(0.11)
lnAge	-0.132***	-0.132***	-0.132***
	(-3.98)	(-2.73)	(-2.87)
lnFVPA	-0.185***	-0.185***	-0.185***
	(-21.29)	(-5.48)	(-5.55)
OCF	0.092*	0.092	0.092
	(1.70)	(1.50)	(1.31)
Std_OCF	0.283**	0.283	0.283
	(2.17)	(1.52)	(1.40)
Discountrate	-0.045***	-0.045***	-0.045***
	(-6.84)	(-4.02)	(-4.41)
Duration	0.056*	0.056	0.056
	(1.81)	(1.08)	(1.33)
Taxrate	-0.055	-0.055*	-0.055*
	(-1.57)	(-1.74)	(-1.85)
ROA	0.045	0.045	0.045
	(0.79)	(0.50)	(0.55)
TDA	0.068**	0.068	0.068
	(2.04)	(1.28)	(1.24)
lnMV	-0.024***	-0.024***	-0.024**
	(-3.29)	(-2.59)	(-2.49)
MB	0.010	0.010	0.010
	(0.95)	(0.66)	(0.71)
SIZE	0.115***	0.115***	0.115***
	(9.11)	(4.85)	(5.20)
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Cluster	No	Firm	Firm and Year
N	2262	2262	2224
R^2	0.554	0.554	0.554

Marginal effect[1] of Target*Post	0.024	0.024	0.024
Mean of the dependent variable	0.195	0.195	0.195
% Marginal effect[2] of Target*Post	12.279	12.279	12.279

[1] Marginal effects are coefficient estimates.

[2] % Marginal effect = 100*(Marginal effect / Mean of dependent variable).

Panel B: Sub-period results

	(1) 2001-07	(2) 2008-14
Target*Post	0.027	0.022**
	(1.25)	(1.98)
Controls	Yes	Yes
Year FE	Yes	Yes
Firm FE	Yes	Yes
Cluster	Firm and Year	Firm and Year
	p-value for the difference[1] = 0.82	
N	1169	1055
R^2	0.604	0.467

Panel C: Results partitioned by activist reputation

	(1) Higher reputation activists	(2) Lower reputation activists
Target*Post	0.044***	0.013
	(3.21)	(1.27)
Controls	Yes	Yes
Year FE	Yes	Yes
Firm FE	Yes	Yes
Cluster	Firm and Year	Firm and Year
	p-value for the difference[1] = 0.047	
N	835	1427
R^2	0.923	0.896

[1]For the difference in the coefficient of Target*Post between columns (1) and (2).

Table 4

Employer contributions to pension plans after hedge fund activism

The table presents estimates from panel regressions of employer contributions to defined benefit pension plans. The dependent variable is a measure of employer contributions: Contribution = ln(Employer contribution in $ millions). *Target* and *Post* are defined in Table 3. Control variables are lnFVPA, OCF, Std_OCF, Discountrate, Duration, Taxrate, ROA, TDA, lnMV, and MB. The *t*-statistics are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. In the last three rows of the table, ME is the marginal effect of Target*Post, Mean is the mean of the dependent variable, and %ME is the % marginal effect of Target*Post, as defined in the footnotes to Table 3. We compute the ME by re-estimating the regression by changing the dependent variable to the unlogged form, employer contribution in $ millions, and the Mean value shown is the mean of employer contribution in $ millions of the regression sample. The row above sample size (N) shows whether and how the standard errors are clustered.

	(1) Contribution	(2) Contribution	(3) Contribution	(4) Contribution
Target*Post	-0.192**	-0.192**	-0.192**	-0.180*
	(-2.40)	(-2.00)	(-2.10)	(-1.89)
Post	0.117	0.117	0.117	0.174
	(0.92)	(1.00)	(1.12)	(1.59)
lnAge	0.087	0.087	0.087	-0.127
	(0.31)	(0.26)	(0.30)	(-0.38)
EMP	0.009**	0.009**	0.009**	0.000
	(2.56)	(2.22)	(2.29)	(0.06)
Controls	No	No	No	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Cluster	No	Firm	Firm and Year	Firm and Year
N	2467	2467	2412	1946

R^2	0.090	0.090	0.090	0.171
ME	-6.368	-6.368	-6.368	-4.184
Mean	24.814	24.814	24.814	26.565
%ME	-25.663	-25.663	-25.663	-15.750

Table 5

Assumed rates of return on plan assets after hedge fund activism

The table presents estimates from panel regressions of assumed rates of return on pension plan assets. The dependent variable is PPROR, the anticipated long-term rate of return on plan assets. *Target* and *Post* are defined in Table 3. Motivated by Bergstresser, Desai, and Rauh (2006), control variables are industry FE based on Fama-French 48 industry classification and/or current and lagged actual returns. The *t*-statistics are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. In the last three rows of the table, ME is the marginal effect of Target*Post, Mean is the mean of the dependent variable, and %ME is the % marginal effect of Target*Post, as defined in the footnotes to Table 3. The row above sample size (N) shows how the standard errors are clustered.

	(1) PPROR	(2) PPROR
Target*Post	0.192*	0.126*
	(1.69)	(1.67)
Post	0.001	-0.023
	(0.01)	(-0.38)
Return		1.233
		(1.20)
Return(t-1)		0.936
		(1.29)
Year FE	Yes	Yes
Industry FE	Yes	Yes
Cluster	Firm and Year	Firm and Year
N	2804	2451
R^2	0.277	0.302
ME	0.192	0.126
Mean	7.217	7.590
%ME	2.663	1.660

Table 6

Pension asset allocation after hedge fund activism

The table presents estimates from panel regressions of asset allocation in pension plans. The dependent variable is %Equity, defined as the percentage of pension assets allocated to equity. *Target* and *Post* are defined in Table 3. The *t*-statistics are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. In the last three rows of the table, ME is the marginal effect of Target*Post, Mean is the mean of the dependent variable, and %ME is the % marginal effect of Target*Post, as defined in the footnotes to Table 3. Compustat data on asset allocations are available only from 2003, as SFAS 132(R), which required asset allocation disclosure, was effective only for fiscal years ending December 2003 or later. In columns (1) and (2), we replace Post with Post1, which equals one at t+1, and zero at t-1. The row above sample size (N) shows how the standard errors are clustered.

	(1) %Equity	(2) %Equity	(3) %Equity	(4) %Equity
Target*Post	2.133*	1.879	1.670	1.354
	(1.66)	(1.52)	(1.05)	(0.88)
Post	-0.543	-0.543	0.396	0.418
	(-1.24)	(-0.90)	(0.46)	(0.45)
ROA		12.822		12.599
		(1.22)		(1.64)
TDA		3.427		4.415
		(1.36)		(1.52)
lnMV		0.558		0.628
		(1.51)		(1.56)
MB		-2.800***		-2.579***
		(-5.13)		(-4.43)
lnAge		1.917**		2.412***
		(2.12)		(2.91)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Cluster	Firm and Year	Firm and Year	Firm and Year	Firm and Year
N	1140	1138	2192	2187
R^2	0.224	0.240	0.205	0.223
ME	2.133	1.879	1.670	1.354
Mean	53.167	53.209	53.245	53.285
%ME	4.012	3.531	3.136	2.541

Table 7

Pension plan performance after hedge fund activism

The table presents estimates from panel regressions of the return on pension plan assets. The dependent variable is Return (=Actual return on pension plan assets / Pension plan assets). *Target* and *Post* are defined in Table 3. Control variables are lnFVPA, OCF, Std_OCF, Discountrate, Duration, Taxrate, ROA, TDA, lnMV, and MB. The *t*-statistics are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The row above sample size (N) shows how the standard errors are clustered.

	(1) Return	(2) Return	(3) Return	(4) Return
Target*Post	0.031	0.006	0.031	0.006
	(1.03)	(0.94)	(1.09)	(1.16)
Post	-0.013	-0.012	-0.013	-0.012
	(-0.93)	(-0.81)	(-1.38)	(-1.04)
lnAge	0.311	0.014	0.311	0.014
	(1.12)	(0.48)	(1.16)	(0.59)
Controls	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Cluster	Firm	Firm	Firm and Year	Firm and Year
N	2695	2240	2667	2203
R^2	0.164	0.557	0.164	0.557
ME	0.031	0.006	0.031	0.006
Mean	0.041	0.046	0.041	0.046
%ME	75.610	13.120	75.610	13.120

Table 8

Assumed pension discount rates after hedge fund activism

The table presents estimates from panel regressions of the discount rate assumed by pension plans to compute the present value of plan liabilities. *Target* and *Post* are defined in Table 3. Because the assumed discount rate appears to be stable over time, we include industry FE in the regressions. The *t*-statistics are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. In columns (1) and (2), we replace Post with Post1, which equals one at t+1, and zero at t-1. The row above sample size (N) shows how the standard errors are clustered.

	(1) Discountrate	(2) Discountrate	(3) Discountrate	(4) Discountrate
Target*Post	0.170***	0.171***	0.173**	0.181**
	(2.99)	(3.02)	(2.23)	(2.34)
Post	-0.057*	-0.060	-0.045	-0.042
	(-1.96)	(-1.25)	(-0.78)	(-0.63)
ROA		0.797		0.938
		(0.99)		(1.41)
TDA		0.206		0.113
		(0.95)		(0.54)
lnMV		0.093***		0.101***
		(3.48)		(3.67)
MB		-0.157*		-0.172**
		(-1.83)		(-2.10)
lnAge		0.014		0.028
		(0.21)		(0.54)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Cluster	Firm and Year	Firm and Year	Firm and Year	Firm and Year
N	1587	1584	3050	3044
R^2	0.390	0.405	0.390	0.409
ME	0.170	0.171	0.173	0.181
Mean	5.377	5.366	5.355	5.358
%ME	3.162	3.187	3.231	3.378

Table 9

Mechanisms: M&A and governance pressure

The table presents estimates from panel regressions of pension underfunding. The dependent variable is Underfund, as defined in Appendix A. *Target* and *Post* are defined in Table 3. Control variables are same as in Table 3. *M&A* equals 'yes,' if the activism is about a merger or acquisition of or by the firm (Audit Analytics activism categories (1), (2), or (3) below); 'no' otherwise. *Governance* equals 'yes' if the activism concerns a governance issue (activism categories (4) to (12) below), and 'no' otherwise. Activism categories: (1) Discussions - Potential M&A discussed, (2) Concerns - Oppose a future acquisition, (3) Agreements - Merger or acquisition agreement, (4) Control: Intent to change or nominate the board of directors, (5) Control - Intent to control the board of directors, (6) Agreements: Board composition, (7) Control: Caused change in management, (8) Control: Intent to replace management, (9) Other: Change in Corporate Bylaws, (10) Control: Intent to maintain control, (11) Intent to acquire control of the company, and (12) Agreements: Voting agreement. Activism is about M&A for 77 unique targets and governance for 398 targets. The p-value for the difference in the coefficients of *Target*Post* between the two samples is 0.03 in column (1) and 0.01 in column (2). We report t-statistics based on standard errors clustered at the firm and year level. The *t*-statistics are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Underfund		Underfund	
	(1)		(2)	
	M&A =Yes	M&A =No	Governance =Yes	Governance = No
Target*Post	0.088***	0.013	0.046*	0.015
	(3.25)	(1.24)	(1.73)	(1.24)
Post	-0.034	0.007	-0.035	0.020*
	(-1.09)	(0.56)	(-1.46)	(1.91)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
ME	0.088	0.013	0.046	0.015
Mean	0.215	0.192	0.191	0.197
%ME	40.856	6.781	24.051	7.615
N	307	1909	767	1449
R^2	0.588	0.576	0.492	0.625

Table 10

Wealth transfer from employees to shareholders

The table presents estimates from cross-sectional regressions of the gains to shareholders from HF activism. We measure shareholder gains as the cumulative abnormal return (CAR) and buy and hold abnormal return (BHAR) on the target stock over days (-10, +10) surrounding the activism announcement date (day 0) relative to the CRSP value-weighted market index. The sample consists of firms targeted by HF activists. We match each target bond to a control bond that has the same numerical rating and the same time to maturity in the same year. The main explanatory variables are *Excess_underfund* and *Short(Long)_excess_bond*. *Short_excess_bond* equals the difference between the month 0 return for the target and control bonds. *Long_excess_bond* equals the difference in the buy and hold return over months (+1, +12) between the target and control bonds. Bond returns are calculated based on the last price at which a bond was traded in a given month and accrued coupon interest. *Excess_underfund* is the difference in pension underfunding between a target and its matched control firm, averaged over years (+1, +2). The sample consists of 848 (663) target bonds in 102 (90) unique target firms for which we have complete data for the regressions in columns (1) and (4) (other columns). The regressions include binary dummy variables for the year of activism and industry (2-digit SIC). We report t-statistics based on standard errors clustered at the firm-level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) CAR	(2) CAR	(3) CAR	(4) BHAR	(5) BHAR	(6) BHAR
Excess_underfund	0.069**	0.065**	0.065**	0.078**	0.078**	0.078**
	(2.25)	(2.35)	(2.35)	(2.08)	(2.27)	(2.27)
Short_excess_bond	-0.014		-0.027	0.001		-0.015
	(-0.50)		(-0.76)	(0.01)		(-0.32)

Long_excess_bond		-0.008	-0.010		-0.010	-0.011
		(-0.90)	(-1.01)		(-0.87)	(-0.85)
SIZE	-3.224*	-3.092	-3.092	-3.327	-2.853	-2.853
	(-1.75)	(-1.55)	(-1.55)	(-1.57)	(-1.22)	(-1.22)
MB	1.136	1.286	1.413	2.135	3.021	3.090
	(0.30)	(0.35)	(0.39)	(0.47)	(0.68)	(0.70)
ROA	-68.837**	-52.588	-51.615	-66.401*	-38.445	-37.916
	(-2.24)	(-1.42)	(-1.40)	(-1.87)	(-0.86)	(-0.85)
TDA	27.536	34.224**	33.984**	45.085*	54.236**	54.106**
	(1.64)	(2.30)	(2.29)	(1.82)	(2.48)	(2.48)
CASH	41.887**	48.138**	47.510**	45.401**	51.649**	51.307**
	(2.26)	(2.48)	(2.46)	(1.97)	(2.21)	(2.20)
DIV	-31.653	-134.985	-138.302	-48.960	-204.590*	-206.394*
	(-1.13)	(-1.45)	(-1.49)	(-1.25)	(-1.67)	(-1.68)
AltmanZ	5.065**	4.692**	4.643**	5.740**	4.946*	4.919*
	(2.47)	(2.30)	(2.28)	(2.24)	(1.94)	(1.93)
OperatingMargin	-20.808	-21.753	-21.822	-33.552	-38.563	-38.601
	(-0.84)	(-0.82)	(-0.83)	(-1.10)	(-1.11)	(-1.11)
Intercept	8.033	35.266*	35.512*	0.086	31.553	31.686
	(0.42)	(1.70)	(1.71)	(0.00)	(1.28)	(1.29)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	848	663	663	848	663	663
R^2	0.763	0.816	0.817	0.746	0.805	0.805

Table 11

Tests of alternative explanations

Each column in the table reports the result of a variant of the difference-in-differences regression. We re-estimate the regression in column (3) of Table 3. Our main interest is the interaction of *Target*Post*. In column (1), the key independent variable is *G→D Switcher*, which is an indicator for an activist who switches its SEC filing status from Schedule 13G (passive ownership) to Schedule 13D (active ownership) subsequently, zero otherwise. We begin with all 13D and 13G filings made by any of the 210 activist hedge funds (HFs) in our sample, i.e., HFs that filed at least one 13D at a firm in our sample, during our sample period. We then identify 13G and 13D filers for each target firm in a given year. The observation thus is at the target-activist-year level. A *G→D Switcher* equals one, if the previous filing by a given activist HF targeting a given company was a 13G and its current filing is a 13D. There are 145 cases of such switches in our sample. Column (2) conducts a falsification test by creating a placebo dummy, *Placebo*. The placebo event year is five years before the actual event date. In column (3), Hostile activism includes cases where activists (1) express their concerns about targets, (2) dispute with targets, or (3) try to control targets. Specifically, hostile activism includes "Concern", "Dispute", or "Control" events as coded in the Audit Analytics database. Details of these events can be found in Appendix B. We estimate the regression on the subsample of hard activism events and their matched control firms. In column (4), we redo our DiD regression after excluding firms that are delisted within two years of activism. In column (5), we estimate this regression on the subsample of companies whose Altman's Z-score is lower (higher or equal to) than median in a given year. Altman's Z-score measures the financial strength of a firm. *Target* equals one for a target firm and zero for a control firm. *Post* equals one if a firm is within $[t+1, t+2]$ years after an activism or a pseudo-activism event; it equals zero

for years [*t-1*, *t-2*]. We also include year and firm fixed effects. We report t-statistics based on standard errors clustered at the firm and year level. Appendix A defines the variables. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5) AltmanZ	
Dep. Var.: Underfund	G to D Switcher	Placebo tests	Hostile Activism only	Attrition: Excl. delisted by post 2 years	Low	High
G→D Switcher × Post	0.035**					
	(2.05)					
Target × Post		0.014	0.037**	0.029**	0.010	0.045***
		(1.08)	(1.99)	(2.06)	(0.56)	(2.94)
Post	-0.005	-0.002	-0.025	-0.001	-0.020	0.010
	(-0.34)	(-0.17)	(-1.40)	(-0.09)	(-1.17)	(0.67)
Hedge Fund FE	Yes					
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
N	4759	3737	1094	1762	985	1135
R^2	0.300	0.529	0.522	0.521	0.586	0.554

Table 12

Long-term effects of hedge fund activism

The table presents estimates from panel regressions. We redo the difference-in-differences specification as in column (3) of Table 3, column (4) of Table 4, and column (4) of Table 8, and replace *Post* with *Post5*, which equal one within [t+1,t+5], zero within [t-1,t-5]. In column (2), we compute the ME by re-estimating the regression by changing the dependent variable to the unlogged form, employer contribution in $ millions, and the Mean value shown is the mean of employer contribution in $ millions of the regression sample. We report t-statistics based on standard errors clustered at the firm and year level. The *t*-statistics are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) Underfund	(2) Contribution	(3) Discountrate
Target*Post5	0.030**	-0.036	0.165**
	(2.30)	(-0.39)	(2.06)
Post5	-0.006	0.016	-0.028
	(-0.58)	(0.20)	(-0.37)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	
Industry FE			Yes
ME	0.030	-3.277	0.165
Mean	0.180	27.568	5.682
%ME	16.667	-11.888	2.904
N	4993	4277	6715
R^2	0.502	0.195	0.422

Table 13

Employer contributions to defined contribution plans after hedge fund activism

The table presents estimates from panel regressions of employer contributions to defined contribution pension plans. Data is from the IRS database. *Target* (*Post5*) is defined in Table 3 (12). We compute the ME by re-estimating the regression by changing the dependent variable to the unlogged form, employer contribution in $, and the Mean value shown is the mean of employer contribution in $ of the regression sample. Standard errors are clustered at the firm and year level. The t-statistics are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
	Ln(Employer contribution)	Ln(Employer contribution)	Ln(Employer contribution)
Target*Post5	-0.227**	-0.211*	-0.147
	(-1.99)	(-1.83)	(-1.16)
Post5	0.057	0.043	0.004
	(0.81)	(0.61)	(0.05)
lnAge		0.067	-0.023
		(0.29)	(-0.08)
EMP		0.010**	0.008**
		(2.48)	(1.97)
OCF			0.150
			(0.47)
Std_OCF			-0.994
			(-1.38)
Taxrate			0.747**
			(2.06)
ROA			-0.177
			(-0.47)
TDA			0.158
			(0.54)
lnMV			0.261***
			(4.63)
MB			-0.078**
			(-2.03)
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes

ME	-488624.800	-768436.500	-790417.100
Mean	1565015.000	1570479.000	1657313.000
%ME	-31.222	-48.930	-47.693
N	6255	6216	5789
R^2	0.011	0.015	0.028

Table 14

Labor unions and employer contributions to defined contribution plans

The table presents estimates from panel regressions of employer contributions to defined contribution pension plans for subsamples based on the presence of labor union. We redo the regressions in Table 13 after partitioning the sample based on the presence of a labor union in each firm. Data is from the IRS database. We compute the ME by re-estimating the regression by changing the dependent variable to the unlogged form, employer contribution in $, and the Mean value shown is the mean of employer contribution in $ of the regression sample. For each column, the regression specification is the same as in Table 13. Standard errors are clustered at the firm and year level.

	(1) Ln(Employer contribution)		(2) Ln(Employer contribution)		(3) Ln(Employer contribution)	
	Union=Yes	Union=No	Union=Yes	Union=No	Union=Yes	Union=No
Target*Post5	-0.013	-0.245**	-0.011	-0.242**	-0.029	-0.118
	(-0.04)	(-2.05)	(-0.04)	(-2.03)	(-0.09)	(-0.89)
Post5	0.226	0.033	0.195	0.029	0.196	-0.031
	(0.89)	(0.43)	(0.76)	(0.39)	(0.75)	(-0.38)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
ME	-1415618	-400318	-469478	-523127	-679622	-413590
Mean	1983759	1517019	1974698	1524222	1973089	1619082
%ME	-71.360	-26.388	-23.775	-34.321	-34.445	-25.545
N	853	5333	844	5302	812	4910
R^2	0.050	0.011	0.065	0.015	0.088	0.030

Appendix A

Variable definitions

This table defines the variables used in the analysis. Lag indicates that a variable is lagged by a year. Names in block capitals are Compustat variable names.

Variable	Definition
Pension	**Data Source: Compustat Pension**
Underfund	(Projected benefit obligation - Pension plan assets)/ Projected benefit obligation
lnFVPA	= ln(PPLAO), where PPLAO = Pension plan assets in $ millions
Discountrate	Discount rate actuarial assumption (PBARR)
Return	Actual returns from plan assets (PBARAT/PPLAO)
%Equity	Pension Asset Allocation in Equity (PNATE)
Contribution	=ln(Pension Employer Contribution (PBEC) in $ millions)
Taxrate	Marginal corporate tax rate after interest deductions (BCG_MTRINT). Missing values are replaced with simulated marginal tax rate from Graham and Mills (2008)
Duration	= Service Cost (PPSC) / (PPSC + Interest Cost (PPIC))
PPROR	Anticipated Long-Term Rate of Return on Plan Assets
Firm	**Data Source: Compustat / Thomson Reuters Mutual Funds**
SIZE	Ln(Total Assets in $ millions)
ROA	Earnings before interest, taxes, depreciation, and amortization (OIBDP) / Total Assets (AT)
TDA	(Total Debt in Current Liabilities (DLC)+Total Long-Term Debt (DLTT)) / Total Assets (AT)
lnMV	Ln(Market value of equity (PRCC_F× CSHO) in $ millions)
lnAge	Ln(Fiscal year – IPO year)
MB	Market value of equity (Total Assets + Market value of equity - Total Common Equity) / Book value of equity {=(AT+CSHO*PRCC_F-CEQ)/AT}
EMP	The number of employees in thousands
AltmanZ	1.2*(Total Current Assets – Total Current Liabilities)/ Total Assets + 1.4*Retained Earnings/Total Assets + 3.3*(Net Income + Total Interest and Related Expense + Total Income Taxes)/ Total Assets + 0.6*Common Shares Outstanding*Stock Price/Total Liabilities + 0.999*Sales /Total Assets) {=1.2*(ACT-LCT)/AT + 1.4*RE/AT + 3.3*(NI+XINT+TXT)/AT + 0.6*CSHO*PRCC_F/LT + 0.999*SALE/AT)}
OCF	Cash flows from operations (OANCF) / Total Assets (AT)
Std_OCF	Standard deviation of OCF for the current and previous four years.
Δ*MF*	Average net change in shares since prior report in quarterly mutual fund holdings, divided by the number of shares outstanding at the

	beginning of the quarter (=Mean of CHANGE / (SHROUT2; shares outstanding in thousand) *1000)).
HHI	Herfindahl-Hirschman index based on sales for a given two-digit SIC industry measured at the end of a fiscal year.
ANALYSTS	Ln(1+Number of analysts covering the firm)
INSTITUTION	Institutional ownership, percent of shares outstanding
CASH	Cash and Short-Term Investments (CHE) / Total Assets (AT)
%Assets_from_NewEquity	New equity issuance / Total Assets (AT) where New equity issuance = Sale of Common and Preferred Stock (SSTK) - Purchase of Common and Preferred Stock (PRSTKC) – Cash Dividends (DV).
OperatingMargin	Earnings Before Interest, taxes, depreciation and amortization (EBITDA) / Sales (SALE)
Bond	**Data Source: WRDS Corporate Bond Database**
Numerical bond rating	Rating number S&P Rating category 1 AAA 2 AA+ 3 AA- 4 AA 5 A+ 6 A 7 A- 8 BBB+ 9 BBB 10 BBB- 11 BB+ 12 BB 13 BB- 14 B+ 15 B 16 B- 17 CCC+ 18 CCC 19 CCC- 20 CC 21 C 22 D 23 NR
Short-run bond return	Bond return for the month of activism announcement (month 0)
Long-run bond return	Compound bond return over months (+1, +12) (i.e., (1+R1)(1+R2)⋯(1+R12) - 1)
Time to maturity	Time to maturity (in years)

Appendix B

Definitions of Shareholder Activism Categories in Audit Analytics database

Agreements

Bankruptcy settlement: Indicates that the Reporting Person has acquired, disposed of or holds his shares in connection with the settlement of a bankruptcy proceeding. **Board composition**: Shares were acquired by the reporting person as part of an agreement concerning how to determine the members of the Issuer's Board of Directors. **Collaborative or licensed business agreement**: Indicates that the Reporting Person purchased his shares in the Issuer as part of an agreement to work together in some aspect of their business operations. **Commitments to management**: Indicates that the Reporting Person has stated that he holds or has acquired his stake in the Issuer in connection with an agreement made with the Issuer's management. **Litigation settlement**: Indicates that the Reporting Person has stated that he acquired, disposed of or holds his shares in connection with the settlement of a legal action. **Lockup Agreement**: Indicates that shares acquired by Reporting Person are part of an agreement between underwriters or insiders of the Issuer forbidding their sale for a specified period of time, often 180 days. **Merger or acquisition agreement**: Indicates Reporting person has acquired his shares in connection with a merger or acquisition of or by the Issuer. **Reorganization**: Shares were acquired in connection with a planned or desired change in the equity base of the Issuer of a significant number of outstanding shares. Company such as a conversion of all outstanding shares to common stock, a reverse split, or the reacquisition by the Issuer of a significant number of outstanding shares. **Standstill Agreement**: Either indicates that the Reporting Person has agreed to not acquire more than a certain specified amount of the Issuer's stock or that the Reporting Person is party to an agreement where in all parties involved undertake not to engage in negotiations with third parties for a certain period of time. **Transaction (Securities, Warrants, Options, Debt, Bonds, etc.)**: Indicates that the Reporting Person acquired or holds his stake in the Issuer as part of an agreement to complete a transaction of some kind. **Voting agreement**: Indicates that the Reporting person has stated that his beneficially owned shares will be used in a pooling agreement for use in obtaining a common objective with one or more other shareholders. **Support management**: Indicates that the Reporting Person has stated his determination to support the Issuer's current management.

Concerns

Concern about stock price: Indicates that the Reporting Person has stated some concern about the current price of his shares-usually that he believes them to be undervalued. **Demand information from management**: Indicates that the Reporting Person has requested, claims to have requested, or intends to request, specific information about the Issuer's strategy, operations, financial information or records. **Oppose a future acquisition**: Indicates that the Reporting Person has stated he intends to work against an acquisition or merger contemplated by the Issuer. **Suggested to management strategy**: Indicates that reporting person has stated that he has offered written or verbal advice to the Issuers management on how they ought to act in the interest of the Issuer.

Control

Caused change in management: Indicates that the Reporting person has caused a change in the management verbal advice to the Issuers management on how they ought to act in the interest

of the Issuer. **Intent to acquire control of the company**: Indicates that the Reporting Person has stated an intention to acquire effective control over the Issuer. **Intent to change or nominate the board of directors**: Indicates that the Reporting Person has stated his intention to work to nominate new members to the Issuer's board of directors and/or to replace existing members. **Intent to control the board of directors**: Indicates that the Reporting Person has stated an intention to control to work to nominate new members to the Issuer's board of directors and/or to replace existing members. **Intent to maintain control**: The Reporting Person has acquired the shares as part of an attempt to keep a controlling influence over the Issuer. **Intent to replace management**: Indicates that the reporting person intends to substitute officers of his choice in place of the current management.

Discussions

Held discussions with management: Indicates that the Reporting person has stated that he has held discussions about the Issuer with its management. **Intent or requested discussions with management**: Indicates that the Reporting person has plans or desires to hold discussions with the Issuer's management. **May (or reserves the right) have discussions with management**: Indicates that the reporting person, while he has not stated any specific intention of holding discussions with the management of the Issuer, has specifically reserved the right to do so. **Potential merger or acquisition discussed**: Indicates that the Reporting Person has engaged in discussion with managers or directors concerning a possible merger or acquisition.

Dispute

Allege management is misleading: Indicates that the Reporting Person has stated that he believes the management to be giving incorrect, purposefully ambiguous or deliberately dishonest information in its public or private statements. **Disagree with management actions or strategy**: Indicates that the Reporting Person has stated that he disagrees with some policy or the overall direction of the Issuer. **Dispute with management**: Indicate that the Reporting Person has stated that he has some dispute with the Issuer's management. **Litigation**: Indicates that the Reported person has stated that he has a dispute concerning the Issuer that has resulted in legal action.

Other

Change in Corporate Bylaws: Reporting party seeks to cause an alteration to the Issuer's Corporate Bylaws or Articles of Organization. **Disposed of investment**: Indicates that the Reporting Person has stated that he has sold, given away or otherwise dispossessed himself of some (1% or more of beneficially owned shares) or all of his shares in the Issuer. **Intends to sell or reduce stake**: Reporting Person has stated an intention of selling or otherwise reducing his stake dispossessed himself of some (1% or more of beneficially owned shares) or all of his shares in the Issuer. **Investment purposes**: Indicates that the Reporting Person has stated that he owns his shares in the Issuer for the purpose of investment. **Not applicable, no change or no intent stated**: Indicates that the Reporting Person does not currently have any plans (other than those stated in previous forms SC 13D) for his shares other than passive ownership. **Stock Delisted**: The Issuer's stock has been removed from the exchange wherein it could be found previously.

Appendix C. Underfunding of defined benefit pension plans after hedge fund activism using a sample matched on additional variables

The table presents estimates from panel regressions of pension underfunding. The sample includes firms targeted by HF activists and their matched control firms. We require that the control firm not be targeted by an activist hedge fund during our sample period. For each target, we pick a control firm listed on Compustat in the same year in its 2-digit SIC industry that has the closest propensity score to the target. Propensity score matching (PSM) is based on lag 1 of the following variables: Tobin's Q, leverage, ROA, log of market value, firm age, Herfindahl-Hirschman index (HHI), analyst following, institutional ownership, cash holding, and percentage of assets from new equity. We then use the following difference-in-differences specification:

$$y_{i,t} = \alpha_0 + \alpha_1 Post_{i,t} + \alpha_2 Target_i \times Post_{i,t} + \underline{\alpha_3} Control_{i,t} + \underline{\alpha_4} Year_t + \underline{\alpha_5} Firm_i + \varepsilon_{i,t}$$

where the dependent variable measures underfunding of firm i in year t. The dependent variable is Underfund = (Projected Benefit Obligation - Pension Plan Assets)/ Projected Benefit Obligation. *Target* equals one if firm i is a target of activism; it equals zero otherwise. *Post* equals one if the firm-year (*i*,*t*) observation is within [*t+1*, *t+2*] years of an activism event or a pseudo-event; it equals zero for years [*t-2*, *t-1*]. The regression includes observations for years *t-2*, *t-1, t+1*, and *t+2. Control* is a vector of firm i's controls. The regressions include year and firm fixed effects. Appendix A defines the variables. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The row above sample size (N) shows whether and how the standard errors are clustered.

	(1) Underfund	(2) Underfund	(3) Underfund
Target*Post	0.047**	0.047**	0.047**
	(2.54)	(2.20)	(2.44)
Post	-0.036	-0.036	-0.036
	(-1.19)	(-1.03)	(-1.03)
lnAge	-0.127*	-0.127**	-0.127**
	(-1.72)	(-2.06)	(-2.26)
lnFVPA	-0.290***	-0.290**	-0.290***
	(-17.70)	(-2.58)	(-2.64)
OCF	0.081	0.081	0.081
	(0.74)	(1.41)	(1.45)
Std_OCF	-0.004	-0.004***	-0.004***
	(-0.72)	(-2.89)	(-2.65)

Discountrate	-0.054***	-0.054**	-0.054**
	(-3.93)	(-2.23)	(-2.50)
Duration	0.064	0.064	0.064
	(0.87)	(0.88)	(0.71)
Taxrate	-0.078	-0.078	-0.078
	(-1.00)	(-1.64)	(-1.38)
ROA	0.136	0.136	0.136
	(0.98)	(0.78)	(0.87)
TDA	-0.084	-0.084	-0.084
	(-1.18)	(-0.85)	(-0.86)
lnMV	-0.049***	-0.049**	-0.049**
	(-2.95)	(-2.40)	(-2.19)
MB	0.004	0.004	0.004
	(0.16)	(0.16)	(0.18)
SIZE	0.162***	0.162***	0.162***
	(6.21)	(2.87)	(3.04)
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Cluster	No	Firm	Firm and Year
N	1926	1926	1899
R^2	0.363	0.363	0.363
Marginal effect[1] of Target*Post	0.047	0.047	0.047
Mean of the dependent variable	0.223	0.223	0.223
% Marginal effect[2] of Target*Post	21.076	21.076	21.076

[1] Marginal effect is coefficient estimate.

[2] % Marginal effect = 100*(Marginal effect / Mean of dependent variable)