JOURNAL OF FINANCIAL AND QUANTITATIVE ANALYSIS Vol. 57, No. 6, Sept. 2022, pp. 2140–2176

doi:10.1017/S002210902100082X

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

Anup Agrawal
University of Alabama Culverhouse College of Business
aagrawal@cba.ua.edu (corresponding author)

Yuree Lim
University of Wisconsin-La Crosse College of Business Administration
ylim@uwlax.edu

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.

I. Introduction

This article deals with 2 broad questions. First, does hedge fund (HF) activism enhance overall firm value? Although 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 policymakers 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

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 an anonymous referee, Alon Brav, Nick Gantchev, Jarrad Harford (the editor), and Joshua Rauh for detailed comments and helpful suggestions. Previous drafts of the article were called "The Dark Side of Hedge Fund Activism: Evidence From Employee Pension Plans." Agrawal acknowledges financial support from the William A. Powell, Jr. Chair in Finance and Banking.

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 article 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 spin-offs, or be acquired. Prior studies find that HF activism is quite successful in increasing shareholder wealth of targeted firms (see Brav et al. (2009), (2015b) for excellent reviews of this literature). However, there are 2 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), Boyson, Gantchev, and Shivdasani (2017), and Jiang, Li, and Mei (2018)). 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), Brav et al. (2015a), and Coffee and Palia (2016)). The 2 sources of shareholder gains have radically different implications about the value of activism for target firms and the broader society. If these gains arise, for example, 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 et al. (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 the best of our knowledge, no prior study has analyzed the effect of HF activism on employee pensions. This article 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 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 Nov. 2012, Relational publicly disclosed

[1]Relatedly, Grennan (2019) finds that greater shareholder governance decreases employee cooperation and integrity due to a greater focus on results.

[2]See Schwartz, N. D. "How Wall Street Bent Steel: Timken Bows to Activist Investors and Splits in Two." *New York Times*, Dec. 6, 2014.

a 6% equity stake in Timken and launched an activist campaign against it. By Sept. 2013, Timken was forced to replace its family CEO. In an investor presentation in Nov. 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 0, and planned a large buyback of shares by the end of 2016. *Wall Street Journal* quotes this example[3] by pointing out, "if we continue down this road, we will not 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 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 (PV) 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 1.5–2 years (see Brav et al. (2009)), but the effect on employee pensions is long term and persists over at least the next 5 years. Although most of our article deals with DB pension plans, about which there are more granular data, we also find that target firms reduce employer contributions in DC plans.

There are 2 potential interpretations of our findings. The most direct interpretation is that HF activists put pressure on managers to increase shareholder wealth and managers respond by raiding employee pension funds. We refer to this as the wealth transfer hypothesis. Alternatively, observable and unobservable characteristics of these firms that lead activist HFs to target them also lead the firms to underfund employee pensions. This is the concern about omitted variables. 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-difference (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, we find that underfunding is due to M&A or governance pressure imposed by activists on managers, which can increase the monitoring of managers and even put their jobs in jeopardy. This finding points to managers' need for a "quick fix." DB employee pension plans are a "soft" target because they are typically under the control of management. Moreover, we find that future increases in pension underfunding explain the stock price reaction to activism announcements, which provides a direct test of the wealth transfer hypothesis. We find that in firms with DB pension plans, about 7% of shareholder wealth gains at the announcement of activism come from employee pensions. Finally, we conduct tests of several alternative hypotheses suggested by Brav et al. (2015a) to disentangle the

[3]Galston, W. A. "'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*, Dec. 9, 2014.

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 3 reasons. First, these plans were already substantially underfunded, on average, by 24% in the year before targeting (see Table 2). Second, although 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 multiemployer plans since Jan. 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., Aslan and Maraachlian (2007), Brav, Jiang, Partnoy, and Thomas (2008), Uchida and Xu (2008), Brav et al. (2009), Huang (2009), Klein and Zur (2011), Jiang, Li, and Wang (2012), Sunder, Sunder, and Wongsunwai (2014), and Feng, Xu, and Zhu (2016)). There is also some prior evidence of wealth transfers from employees (see Brav et al. (2015a)). Our article 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), Denes, Karpoff, and McWilliams (2017), and Edmans and Holderness (2017)).

The article proceeds as follows: Section II discusses the related literature and develops our main hypothesis. Section III details the data and sample. Section IV presents our baseline results. Section V examines the channels through which the effect arises. Section VI analyzes the underlying economic mechanisms. Section VII presents identification and robustness checks. Section VIII examines DC plans, and Section IX concludes.

II. Prior Literature and Main Hypothesis

This article examines whether HF activism hurts the health of employee DB pension plans, which represent employees' postretirement 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, that is, 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 Sept. 2014, so its guarantee is hardly solid.[5] More specifically, pension plan funding is defined as follows:

$$\text{(1)}\quad \text{FUNDING} = \text{FAIR\_VALUE}\,(\text{PLAN\_ASSETS}) - \text{PRESENT\_VALUE}\,(\text{PLAN\_OBLIGATIONS}).$$

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:

$$\begin{aligned}\text{(2)}\quad &\text{FAIR\_VALUE}\,(\text{PLAN\_ASSETS})\\ &= \text{CONTIBUTIONS}\left(\text{MINIMUM} + \widetilde{\text{DISCRETIONARY}}\right)\\ &\quad + \widetilde{\text{RETURN\_ON\_PLAN\_ASSETS}}\end{aligned}$$

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 1 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

[4]See Wasik, J. "Is Your Pension Plan Underfunded?" *Forbes*, Sept. 3, 2014; and Norris, F. "Private Pension Plans, Even at Big Companies, May Be Underfunded." *New York Times*, July 21, 2012.

[5]See Pollock, A. J. "A Federal Guarantee Is Sure to Go Broke." *Wall Street Journal*, Nov. 30, 2014.

[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 to shareholders. Brav et al. (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 (2019) finds that shareholders realize financial gains, such as increases in sales, profitability, and payouts, whereas 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 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 are the exercise price. Therefore, 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 PV 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)).

III. Data and Methodology

A. Corporate Pension Plans

A pension plan can be either a DB plan or a 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% of 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% of earnings annually. These contributions generally are invested on the employee's behalf. Employees ultimately receive the balance in their accounts, which equals contributions plus investment gains or losses. The value of the account fluctuates with changes in the value of the investments and contributions. Examples of DC plans include 401(k) plans, 403(b) plans, employee stock ownership plans, and profit-sharing plans.

B. 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 Securities and Exchange Commission (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, whereas 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.

C. Sample Selection

1. Pension Data

Our first pension data set 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 data set on corporate pension plans is the Internal Revenue Service (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 the

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

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, the 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.

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 are 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 an HF, private equity, venture capital, or other investment funds. However, 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 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 III.D).

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.

D. 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 PSM method similar to Brav, Jiang, Ma, and Tian (2018). We require the control firm not to 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 logarithm of market value.

TABLE 1

Hedge Fund Activism

Table 1 shows the number of HF activism events by year and by Fama–French 12 industries. 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 Securities and Exchange Commission 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 are 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

We report summary statistics of firm and pension plan characteristics of target and control firms 1 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 2 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 PV of plan liabilities (5.62% vs. 5.37%), logarithm of firm age (2.94 vs. 2.82), and institutional ownership (48% vs. 42%). Other than that, the 2 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 logarithm of firm age. In the baseline specification, we do not match on institutional ownership because HF 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 PSM, 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 a 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 nontargets (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

TABLE 2

Summary Statistics of Target and Control Samples and Tests of Parallel Trends

Panel A of Table 2 shows mean and median values for target and control firms in year −1 (i.e., 1 year before the year of the activism event). We match each target firm to a nontarget firm on Compustat from the same year and the same 2-digit SIC industry using the propensity score matching method. We require the control firm not to 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 logarithm of market value (ln(MV)). For each variable, we report the mean (median) values for the target and control samples, and *t*-statistics (*p*-values of the Wilcoxon test) of the differences between them. UNDERFUND is (Projected benefit obligation − pension plan assets)/projected benefit obligation. Panel B (C) shows univariate (multivariate) tests of the parallel trends assumption. In Panel B, the *n*-year growth rate in UNDERFUND is defined as $((\text{UNDERFUND}_{-1}/\text{UNDERFUND}_{-1-n}) - 1)$. Appendix A defines the variables. The number of observations of 1-year-lagged variables ranges from 274 to 544.

Variable	Mean			Median		
	Target	Control	*t*-Stat for Difference	Target	Control	Wilcoxon Test *p*-Value
Panel A. Summary Statistics of Target and Control Samples in Year −1						
Pension characteristics						
UNDERFUND	0.24	0.25	−0.13	0.24	0.22	0.90
CONTRIBUTE	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
DSCNTRATE	5.62	5.37	2.17	5.75	5.75	0.08
ln(FVPA)	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
ln(MV)	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
ln(AGE)	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
ASSETSFROMNEWEQUITY	−0.02	0.00	−1.59	0.00	0.00	0.79
ALTMANZ	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. Multivariate Tests of Parallel Trends Assumption	Target 1	Target 2
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	4,230	3,856
R^2	0.079	0.089

plans in target firms increases over the 2 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

TABLE 3

Underfunding of Defined Benefit Pension Plans After Hedge Fund Activism

Panel A of Table 3 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 DiD specification:

$$Y_{i,t} = \alpha_0 + \alpha_1 \text{POST}_{i,t} + \alpha_2 \text{TARGET}_i \times \text{POST}_{i,t} + \alpha_3 \text{CONTROLS}_{i,t} + \alpha_4 \text{YEAR}_t + \alpha_5 \text{FIRM}_i + \varepsilon_{i,t},$$

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 1 if firm i is a target of activism; it equals 0 otherwise. POST equals 1 if the firm–year (i,t) observation is within $[t+1, t+2]$ years of an activism event or a pseudo-event; it equals 0 for years $[t-1, t-2]$. CONTROLS is a set of firm i's controls. The regressions include year and firm fixed effects. In Panel B, we show regression results for 2 equal subperiods of our sample and the p-value of the t-statistic for the difference between them. In Panel C, we measure activist reputation using the 3 measures proposed by Krishnan, Partnoy, and Thomas (2016): Most active hedge funds (HFs), Top investor HFs, and Top return HFs. 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 HFs 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," whereas the remaining are "lower reputation activists." Appendix A defines other variables. The row above sample size (N) shows whether and how the standard errors are clustered. The t-statistics are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. [a]Marginal effects are coefficient estimates. [b]% Marginal effect = 100 × (marginal effect/mean of dependent variable). [c]For the difference in the coefficient of TARGET × POST between columns 1 and 2.

Panel A. Baseline Results

	UNDERFUND		
	1	2	3
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)
ln(AGE)	−0.132***	−0.132***	−0.132***
	(−3.98)	(−2.73)	(−2.87)
ln(FVPA)	−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)
DSCNTRATE	−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)
ln(MV)	−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	2,262	2,262	2,224
R^2	0.554	0.554	0.554
Marginal effect[a] of TARGET × POST	0.024	0.024	0.024
Mean of the dependent variable	0.195	0.195	0.195
% Marginal effect[b] of TARGET × POST	12.279	12.279	12.279

(continued on next page)

TABLE 3 (continued)

Underfunding of Defined Benefit Pension Plans After Hedge Fund Activism

Panel B. Subperiod Results

	2001–2007	2008–2014
	1	2
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[c] = 0.82	
N	1,169	1,055
R^2	0.604	0.467

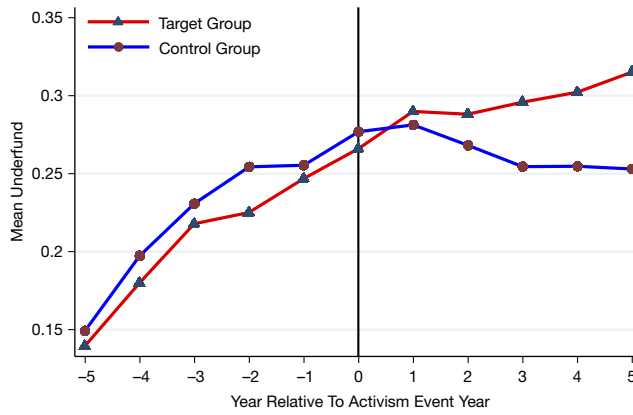
Panel C. Results Partitioned by Activist Reputation

	Higher Reputation Activists	Lower Reputation Activists
	1	2
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[c] = 0.047	
N	835	1,427
R^2	0.923	0.896

FIGURE 1

Parallel Trends

Figure 1 plots mean underfunding rates between target firms and their matched control firms using the propensity score matching procedures as described in Table 2. Year 0 is the activism event year.



firms based on either mean or median values of the 1-year or 2-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 2 groups of firms up to year 0. After that, the underfunding level increases dramatically for targets, whereas 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:

$$\begin{aligned}(3)\quad \text{TARGET}_i = {} & \alpha_0 + \alpha_1 1 - \text{or} \\ & 2 - \text{year growth rates in UNDERFUND}_{i,t-1} + \alpha_2 \text{CONTROLS}_{i,t} \\ & + \alpha_3 \text{YEAR}_t + \alpha_4 \text{INDUSTRY}_{j(i)} + \varepsilon_{i,t},\end{aligned}$$

where the dependent variable TARGET_i equals 1 if firm i is a target of activism over the sample period; it equals 0 otherwise. The key independent variables are 1-year or 2-year growth rates in UNDERFUND as of year -1. $\text{CONTROLS}_{i,t}$ is a set 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.

E. 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 et al. (2018), our main regression adopts the DiD approach:

$$\begin{aligned}(4)\quad Y_{i,t} = {} & \alpha_0 + \alpha_1 \text{POST}_{i,t} + \alpha_2 \text{TARGET}_i \times \text{POST}_{i,t} + \alpha_3 \text{CONTROLS}_{i,t} \\ & + \alpha_4 \text{YEAR}_t + \alpha_5 \text{FIRM}_i + \varepsilon_{i,t},\end{aligned}$$

where the dependent variable $Y_{i,t}$ is UNDERFUND for firm i at time t. TARGET_i equals 1 if firm i is a target of activism over the sample period; it equals 0 otherwise. $\text{POST}_{i,t}$ equals 1 if the firm–year (i,t) observation falls within $[t+1, t+2]$ years of an activism event or a pseudo-event; it equals 0 otherwise. We pick the initial year of activism (t) in cases where a firm is targeted multiple times over 2001–2014. $\text{CONTROLS}_{i,t}$ is a set 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.

F. 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 PV of pension liabilities minus the fair value of pension assets, all divided by the PV of pension liabilities. Therefore, a high value of 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 (DSCNTRATE). CONTRIBUTE is the logarithm of employer contributions in million dollars. Finally, although 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.

G. Key Independent Variable

We test our main hypothesis using a DiD 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.

H. 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., Amir and Gordon (1996), Sundaresan and Zapatero (1997), Asthana (1999), and Rauh (2009)). Specifically, a high marginal tax rate creates stronger incentives to fund pension plans and invest in highly taxed assets (Black (1980), Thomas (1988), and 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 (2006)).

IV. 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 2 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 $\text{TARGET}_i \times \text{POST}_{i,t}$ is positive and statistically significant in all 3 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 3 rows of the table show that the marginal effect of the DiD term TARGET $\times$ 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 nontrivial

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)). Therefore, 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 2 equal halves of our sample period: 2001–2007 and 2008–2014. The coefficient estimate of TARGET × POST is roughly similar between the 2 subperiods, and the 2 are statistically indistinguishable from each other (p-value for the difference = 0.82).

Finally, we examine reputation effects of HF activism. Krishnan et al. (2016) find that high reputation HF activists tend to be more influential. Therefore, 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 3 reputation measures used by Krishnan et al. (2016), 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. (2016), we find that underfunding is more pronounced for firms targeted by high reputation HF activists.

V. 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 PV 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.

A. 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 million dollars. 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%–26% relative to their previous levels. This evidence confirms that employee pension plans suffer from underfunding due to reduced employer contributions to the plans.

TABLE 4

Employer Contributions to Pension Plans After Hedge Fund Activism

Table 4 presents estimates from panel regressions of employer contributions to defined benefit pension plans. The dependent variable is a measure of employer contributions: CONTRIBUTE = ln(Employer contribution in million dollars). TARGET and POST are defined in Table 3. Control variables are ln(FVPA), OCF, STD_OCF, DSCNTRATE, DURATION, TAXRATE, ROA, TDA, ln(MV), and MB. In the last 3 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 Table 3. We compute the ME by re-estimating the regression by changing the dependent variable to the unlogged form, employer contribution in million dollars, and the Mean value shown is the mean of employer contribution in million dollars of the regression sample. The row above sample size (*N*) shows whether and how the standard errors are clustered. The *t*-statistics are in parentheses. * and ** indicate statistical significance at the 10% and 5% levels, respectively.

	CONTRIBUTE	CONTRIBUTE	CONTRIBUTE	CONTRIBUTE
	1	2	3	4
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)
ln(AGE)	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	2,467	2,467	2,412	1,946
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

B. 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. Therefore, 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 3 rows of the table show that the magnitude of this effect is about 1.7%–2.7% of the mean assumed return of 7.2%–7.6%.[8]

C. 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

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

TABLE 5

Assumed Rates of Return on Plan Assets After Hedge Fund Activism

Table 5 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. In the last 3 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 Table 3. The row above sample size (*N*) shows how the standard errors are clustered. The *t*-statistics are in parentheses. * indicates statistical significance at the 10% level.

	PPROR 1	PPROR 2
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	2,804	2,451
R^2	0.277	0.302
ME	0.192	0.126
Mean	7.217	7.590
%ME	2.663	1.660

contributions needed to maintain plan health for some time. Third, stockholders are inclined to tilt pension portfolios toward 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 3 rows in the table show that the magnitude of this effect is about 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]

D. 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

[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.

TABLE 6

Pension Asset Allocation After Hedge Fund Activism

Table 6 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. In the last 3 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 Table 3. Compustat data on asset allocations are available only from 2003, as the Statement of Financial Accounting Standards 132(R), which required asset allocation disclosure, was effective only for fiscal years ending Dec. 2003 or later. In columns 1 and 2, we replace Post with POST1, which equals 1 at $t+1$, and 0 at $t-1$. The row above sample size (*N*) shows how the standard errors are clustered. The *t*-statistics are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	%EQUITY 1	%EQUITY 2	%EQUITY 3	%EQUITY 4
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)
ln(MV)		0.558		0.628
		(1.51)		(1.56)
MB		−2.800***		−2.579***
		(−5.13)		(−4.43)
ln(AGE)		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	1,140	1,138	2,192	2,187
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

Table 7 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 ln(FVPA), OCF, STD_OCF, DSCNTRATE, DURATION, TAXRATE, ROA, TDA, ln(MV), and MB. In the last 3 rows of the table, ME is the marginal effect of TARGET x POST, Mean is the mean of the dependent variable, and %ME is the % marginal effect of TARGET x POST, as defined in Table 3. The row above sample size (*N*) shows how the standard errors are clustered. The *t*-statistics are in parentheses.

	RETURN 1	RETURN 2	RETURN 3	RETURN 4
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)
ln(AGE)	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	2,695	2,240	2,667	2,203
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

returns on its pension assets. The coefficient of the interaction term, TARGET × POST, is statistically insignificant under various specifications.

E. Discount Rate

We next examine whether firms targeted by HF activists increase the discount rates to reduce the PVs 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 dependent variables with DSCNTRATE assumed by the pension plan. Table 8 shows that after being targeted by activists, firms increase the pension discount rate used to compute the PV of pension liabilities and the coefficient estimate of this increase is statistically significant. In the last 3 rows, the size of the marginal effect is 0.17 percentage points or about 3.2% of the mean discount rate of 5.4%.

F. 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),

TABLE 8

Assumed Pension Discount Rates After Hedge Fund Activism

Table 8 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. In columns 1 and 2, we replace POST with POST1, which equals 1 at $t+1$, and 0 at $t-1$. In the last 3 rows of the table, ME is the marginal effect of TARGET x POST, Mean is the mean of the dependent variable, and %ME is the % marginal effect of TARGET x POST, as defined in Table 3. The row above sample size (*N*) shows how the standard errors are clustered. The *t*-statistics are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	DSCNTRATE 1	DSCNTRATE 2	DSCNTRATE 3	DSCNTRATE 4
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)
ln(MV)		0.093***		0.101***
		(3.48)		(3.67)
MB		−0.157*		−0.172**
		(−1.83)		(−2.10)
ln(AGE)		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	1,587	1,584	3,050	3,044
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

and Rauh, Stefanescu, and Zeldes (2020)). 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.

VI. Underlying Mechanisms

A. 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. Columns 1 and 2 of Table 9 show 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

TABLE 9

Mechanisms: M&A and Governance Pressure

Table 9 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 (i), (ii), or (iii) below); "no" otherwise. *Governance* equals "yes" if the activism concerns a governance issue (activism categories (iv)–(xii) below), and "no" otherwise. Activism categories: i) Discussions – Potential M&A discussed, ii) Concerns – Oppose a future acquisition, iii) Agreements – Merger or acquisition agreement, iv) Control – Intent to change or nominate the board of directors, v) Control – Intent to control the board of directors, vi) Agreements – Board composition, vii) Control – Caused change in management, viii) Control – Intent to replace management, ix) Other – Change in Corporate Bylaws, x) Control – Intent to maintain control, xi) Intent to acquire control of the company, and xii) 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 2 samples is 0.03 in column 1 and 0.01 in column 2. In the 3 rows above N, ME is the marginal effect of TARGET x POST, Mean is the mean of the dependent variable, and %ME is the % marginal effect of TARGET x POST, as defined in Table 3. The *t*-statistics based on standard errors clustered at the firm and year level are in parentheses. * and *** indicate statistical significance at the 10% and 1% levels, respectively.

	UNDERFUND 1		UNDERFUND 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	1,909	767	1,449
R^2	0.588	0.576	0.492	0.625

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 2 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.

B. 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 $+10$, -1. 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, EXC_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 III.D that has the same numerical rating (on a scale of 1–23; see Appendix A) and the same maturity in years in the activism announcement year (year 0). However, this procedure yields a controlled bond for only 20 or our target firms, which is insufficient for any meaningful statistical analysis. Therefore, 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, whereas 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 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_EXC_BOND equals

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

the difference between the month 0 (i.e., the activism announcement month) return for the target and control bonds. LONG_EXC_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_EXC_BOND, we require a nonmissing return observation over month 0 and at least a nonmissing 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 EXC_UNDERFUND and SHORT_EXC_BOND or LONG_EXC_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 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 EXC_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 EXC_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_EXC_BOND and LONG_EXC_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 DB pension plans that become targets of HF activists.

VII. Identification and Robustness

Section IV 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

[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 nonmissing 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.

[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.

TABLE 10

Wealth Transfer to Shareholders From Employee Pensions and Bondholders

Table 10 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. The main explanatory variables are EXC_UNDERFUND and SHORT(LONG)_EXC_BOND. The variable EXC_UNDERFUND is the difference in pension underfunding between a target and its matched control firm, averaged over years (+1, +2). SHORT_EXC_BOND equals the difference between the month 0 return for the target and control bonds. LONG_EXC_BOND equals the difference in the buy-and-hold return over months (+1, +12) between the target and control bonds. 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. Bond returns are calculated based on the last price at which a bond was traded in a given month and accrued coupon interest. 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). The *t*-statistics based on standard errors clustered at the firm level are in parentheses. * and ** indicate statistical significance at the 10% and 5% levels, respectively.

	CAR			BHAR		
	1	2	3	4	5	6
EXC_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_EXC_BOND	−0.014		−0.027	0.001		−0.015
	(−0.50)		(−0.76)	(0.01)		(−0.32)
LONG_EXC_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 FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	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

to shareholders. However, these findings are also consistent with 2 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 V, 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 PV of plan liabilities appear lower (Table 8). Second, in Section VI, 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 5 alternate interpretations of our findings. As discussed in Section VII.A, none of these alternative explanations hold up to empirical scrutiny, leaving our interpretation as the most likely one.

A. Alternative Explanations

1. Stock-Picking Skill of HFs

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 et al. (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 a 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_SWITCH equals 1, 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_SWITCH × POST. Column 1 of Table 11 shows the result. We find a significant positive effect on underfunding of target firms in the 2 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.

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 meanreversion 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 5 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

TABLE 11

Tests of Alternative Explanations

Each column in Table 11 reports the result of a variant of the difference-in-difference 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_SWITCH, which equals 1 for an activist who switches its Securities and Exchange Commission filing status for a given target company from Schedule 13G (passive ownership) to Schedule 13D (active ownership) (i.e., its previous filing was a 13G and the current filing is a 13D), and 0 otherwise. We begin with all 13D and 13G filings made by any of the 210 activist hedge funds (HFs) in our sample, that is, 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. There are 145 cases of such switches in our sample. Column 2 conducts a falsification test by creating a placebo dummy. The placebo event year is 5 years before the actual event date. In column 3, Hostile activism includes cases where activists i) express their concerns about targets, ii) dispute with targets, or iii) 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 2 years of activism. In column 5, we estimate this regression on the subsample of companies whose Altman's *Z*-score is lower (equal to or higher) than median in a given year. Altman's *Z*-score measures the financial strength of a firm. TARGET equals 1 for a target firm and 0 for a control firm. POST equals 1 if a firm is within $[t+1, t+2]$ years after an activism or a pseudo-activism event; it equals 0 for years $[t-1, t-2]$. Appendix A defines the variables. We also include year and firm fixed effects. The *t*-statistics based on standard errors clustered at the firm and year level are in parentheses. **, and *** indicate statistical significance at the 5%, and 1% levels, respectively.

	G to D Switcher	Placebo Tests	Hostile Activism Only	Attrition: Excl. Delisted by Post 2 Years	AltmanZ	
					Low	High
Dep. Var.: UNDERFUND	1	2	3	4	5	
G → D_SWITCH × 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	4,759	3,737	1,094	1,762	985	1,135
R^2	0.300	0.529	0.522	0.521	0.586	0.554

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 is simply an artifact of mean reversion.

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 an 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)). Therefore, 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 et al. (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. Although 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 i) express their concerns about targets, ii) dispute with targets, or iii) try to control targets. By contrast, the rest of the targets experience soft activism, a nonhostile approach where an activist communicates with management. Therefore, 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 0. However, 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.

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 et al. (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 et al. (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 2 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.

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 et al. (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.

B. Long-Run Effects of Activism

We next explore whether the pension underfunding we observe over 2 years 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 1 for years $[t + 1, t + 5]$, and 0 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 5 years following activism. The size of the marginal effect is 3 percentage points or about 17% of the mean underfunding rate

TABLE 12

Long-Term Effects of Hedge Fund Activism

Table 12 presents estimates from panel regressions. We redo the difference-in-difference 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 1 within $[t+1, t+5]$, and 0 within $[t-1, t-5]$. In the 3 rows above N, ME is the marginal effect of TARGET x POST5, Mean is the mean of the dependent variable, and %ME is the % marginal effect of TARGET x POST5, as defined in Table 3. In column 2, we compute the ME by re-estimating the regression by changing the dependent variable to the unlogged form (i.e., employer contribution in million dollars), and the Mean value shown is the mean of employer contribution in million dollars of the regression sample. The *t*-statistics based on standard errors clustered at the firm and year level are in parentheses. ** indicates statistical significance at the 5% level.

	UNDERFUND 1	CONTRIBUTE 2	DSCNTRATE 3
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	4,993	4,277	6,715
R^2	0.502	0.195	0.422

of 18%. The underlying channel appears to be an increase in the discount rate that target firms assume when calculating the PV of pension obligations. The marginal effect here is 0.165 percentage points or about 2.9% of the mean discount rate of 5.7%.

VIII. Defined Contribution Plans

Our data source on employee pension plans thus far is Compustat Pension files, which do not have data on DC plans and labor unions. In this section, we obtain these 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 and supplement it by matching with the company name. Therefore, 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 III.D. Using the target and matched nontarget 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 1 for targets of activism, and 0 otherwise, and POST5 equals 1 for years $[t+1, t+5]$, and 0 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 2 specifications. The size of the marginal effect varies between −$0.5 million and −$0.8 million in various specifications, or a whopping 31%–48% of the mean employer contribution.

Finally, we examine the role of labor unions in our setting. We divide our DC sample into 2 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

TABLE 13

Employer Contributions to Defined Contribution Plans After Hedge Fund Activism

Table 13 presents estimates from panel regressions of employer contributions to defined contribution pension plans. Data are from the Internal Revenue Service 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 dollars, and the Mean value shown is the mean of employer contribution in thousands of dollars of the regression sample. The *t*-statistics based on standard errors clustered at the firm and year level are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	ln(Employer Contribution)		
	1	2	3
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)
ln(AGE)		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)
ln(MV)			0.261***
			(4.63)
MB			−0.078**
			(−2.03)
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
ME in thousand dollars	-488.6	-768.4	-790.4
Mean	1,565.0	1,570.5	1,657.3
%ME	−31.22	−48.93	−47.69
N	6,255	6,216	5,789
R^2	0.011	0.015	0.028

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 nonunionized firms than in unionized firms. However, the difference in coefficients between the 2 subsamples is statistically insignificant.

IX. Conclusion

Shareholder gains from activism can partly 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 article, 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

TABLE 14

Labor Unions and Employer Contributions to Defined Contribution Plans

Table 14 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 are from the Internal Revenue Service database. We compute the ME by re-estimating the regression by changing the dependent variable to the unlogged form, employer contribution in dollars, and the Mean value shown is the mean of employer contribution in thousands of dollars of the regression sample. For each column, the regression specification is the same as in Table 13. The *t*-statistics based on standard errors clustered at the firm and year level are in parentheses. ** indicates statistical significance at the 5% level.

	ln(Employer Contribution)					
	Union 1		Union 2		Union 3	
	Yes	No	Yes	No	Yes	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 in thousand dollars	-1,415.6	-400.3	-469.5	-523.1	-679.6	-413.6
Mean	1,983.8	1,517.0	1,974.7	1,524.2	1,973.1	1,619.1
%ME	−71.36	-26.39	-23.78	−34.32	−34.44	-25.55
N	853	5,333	844	5,302	812	4,910
R^2	0.050	0.011	0.065	0.015	0.088	0.030

investments and the discount rate used to compute the PV of plan obligations. Although 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 1.5–2 years, but the effect on employee pensions is longer term and persists over at least the next 5 years. Although most of our article deals with DB pension plans, about which there is more information, we also find that target firms reduce employer contributions in DC plans.

We present evidence that pension underfunding appears to be due to M&A or governance pressure applied by activists. In the face of a strong threat to their careers, managers appear to raid employee DB pension plans by way of a "quick fix." DB pension plans are a "soft" target because they are typically under the control of managers. We find that about 7% 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 article extends the literature showing that part of the wealth gains to shareholders in HF activism come from other stakeholders (see, e.g., Klein and Zur (2011), Brav et al. (2015a), and Feng et al. (2016)). Our empirical results point to a negative effect of HF activism on workers' welfare. However, our findings should be viewed in the context of a large literature that finds many positive effects of HF activism on firms and society. The overall welfare effect of HF activism is an interesting topic for future research. Finally, our findings have important implications for public guarantees and regulation of private pension plans.

Appendix A. Variable Definitions and Data Sources

Lag indicates that a variable is lagged by a year. Compustat or Thomson Reuters Mutual Funds data item names are in parentheses.

Pension Variables (Data Source: Compustat Pension)

UNDERFUND: (Projected benefit obligation (pbaco) − pension plan assets (pplao))/(pbaco).

ln(FVPA): ln(fair value of pension plan assets in million dollars (pplao)).

DISCOUNTRATE: Discount rate actuarial assumption (pbarr).

RETURN: Actual returns from plan assets (pbarat/pplao).

%EQUITY: Pension asset allocation in equity (pnate).

CONTRIBUTION: ln(employer pension contribution in million dollars (pbec)).

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 (ppror).

Firm Variables (Data Source: Compustat, except as noted)

SIZE: ln(total assets in million dollars (at)).

ROA: Earnings before interest, taxes, depreciation, and amortization (ebitda)/total assets (at).

TDA: (Total debt in current liabilities (dlc) + total long-term debt (dltt))/total assets (at).

ln(MV): ln(market value of equity in million dollars (prcc_f × csho)).

ln(AGE): ln(fiscal year − IPO year).

MB: Market value of equity (total assets (at) + market value of equity (csho × prcc_f) − total common equity (ceq))/book value of equity (at).

EMP: The number of employees in thousands (emp).

ALTMANZ: 1.2 × (total current assets (act) − total current liabilities (lct))/total assets (at) + 1.4 × retained earnings (re)/total assets (at) + 3.3 × (net income (ni) + total interest and related expense (xint) + total income taxes(txt))/total assets (at) + 0.6 × common shares outstanding (csho) × stock price (prcc_f)/total liabilities (lt) + 0.999 × sales (sale)/total assets (at).

OCF: Cash flows from operations (oancf)/total assets (at).

STD_OCF: Standard deviation of OCF for the current and prior 4 years.

HHI: Herfindahl–Hirschman index (HHI) based on sales for a given 2-digit SIC industry measured at the end of a fiscal year.

ANALYSTS: ln(1 + number of analysts covering the firm). Source: IBES.

INSTITUTION: Institutional ownership, percentage of shares outstanding. Source: Thomson Financial 13F Holdings.

CASH: Cash and short-term investments (che)/total assets (at).

%ASSETS_FROM_NEWEQUITY: New equity issuance/total assets (at) where new equity issuance is 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).

Mutual Fund Variable (Data Source: Thomson Reuters Mutual Funds)

ΔMF: Average of net change in shares since prior report in quarterly mutual fund holdings (change), divided by the number of shares outstanding at the beginning of the quarter (shrout2 × 1,000).

Bond Variables (Data Source: WRDS Corporate Bond Database)

NUMERICAL_BOND_RATING: Rating number in 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; and 23: NR.

SHORTRUN_BOND_RETURN: Bond return for the month of activism announcement (month 0).

LONGRUN_BOND_RETURN: Compound bond return over months [+1, +12], that is, $\{1 + R1\}\{1 + R2\}\cdots\{1 + R12\} - 1$.

TIME_TO_MATURITY: Time to maturity in years.

Appendix B. Definitions of Shareholder Activism Categories

Appendix B. provides details of activism events defined 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 that 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: Indicates either that the Reporting Person has agreed not to acquire more than a certain specified amount of the Issuer's stock or that the Reporting Person is partly to an agreement, wherein 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 that 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 Issuer's 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 Issuer's 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: Indicates that 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 to) 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: Indicates 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: Indicates that the 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: Indicates that the 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

Appendix C presents estimates from panel regressions of pension underfunding. The sample includes firms targeted by HF activists and their matched control firms. We require the control firm not to 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 is based on lag 1 of the following variables: Tobin's Q, leverage, ROA, logarithm of market value, firm age, HHI, analyst following, institutional ownership, cash holding, and percentage of assets from new equity. We then use the following DiD specification:

$$Y_{i,t} = \alpha_0 + \alpha_1 \text{POST}_{i,t} + \alpha_2 \text{TARGET}_i \times \text{POST}_{i,t} + \alpha_3 \text{CONTROLS}_{i,t} + \alpha_4 \text{YEAR}_t + \alpha_5 \text{FIRM}_i + \varepsilon_{i,t},$$

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 1 if firm i is a target of activism; it equals 0 otherwise. POST equals 1 if the firm–year (i,t) observation is within $[t+1, t+2]$ years of an activism event or a pseudo-event; it equals 0 for years $[t-2, t-1]$. The regression includes observations for years $t-2$, $t-1$, $t+1$, and $t+2$. CONTROLS is a set of firm i's controls. The regressions include year and firm fixed effects. Appendix A defines the variables. The row above sample size (N) shows whether and how the standard errors are clustered. The t-statistics are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	UNDERFUND	UNDERFUND	UNDERFUND
	1	2	3
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)
ln(AGE)	−0.127*	−0.127**	−0.127**
	(−1.72)	(−2.06)	(−2.26)
ln(FVPA)	−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)
DSCNTRATE	−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)
ln(MV)	−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	1,926	1,926	1,899
R^2	0.363	0.363	0.363
Marginal effect[a] of TARGET × POST	0.047	0.047	0.047
Mean of the dependent variable	0.223	0.223	0.223
% Marginal effect[b] of TARGET × POST	21.076	21.076	21.076

[a] Marginal effect is coefficient estimate.
[b] % Marginal effect = 100 × (marginal effect/mean of dependent variable).

References

Amir, E., and E. A. Gordon. "Firms' Choice of Estimation Parameters: Empirical Evidence from SFAS No. 106." *Journal of Accounting, Auditing and Finance*, 11 (1996), 427–448.

Anantharaman, D., and Y. G. Lee. "Managerial Risk Taking Incentives and Corporate Pension Policy." *Journal of Financial Economics*, 111 (2014), 328–351.

Andonov, A.; R. Bauer; and M. Cremers. "Pension Fund Asset Allocation and Liability Discount Rates." *Review of Financial Studies*, 30 (2017), 2555–2595.

Aslan, H., and P. Kumar. "The Product Market Effects of Hedge Fund Activism." *Journal of Financial Economics*, 119 (2016), 226–248.

Aslan, H., and H. Maraachlian. "Wealth Effects of Hedge Fund Activism." Working Paper, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=993170 (2007).

Asthana, S. "Determinants of Funding Strategies and Actuarial Choices for Defined-Benefit Pension Plans." *Contemporary Accounting Research*, 16 (1999), 39–74.

Bae, K. H.; B. Baik; and J. M. Kim. "Do Hedge Funds Have Information Advantages? Evidence from Hedge Fund Stock Holdings." Working Paper, available at https://scholar.archive.org/work/rnhd5c6v4rd5thjrc6pugn3zlq/access/wayback/http://www.apjfs.org:80/conference/2011/cafmFile/6-3.pdf (2011).

Bean, D. F., and R. A. Bernardi. "Underfunding Pension Obligations While Paying Dividends: Evidence of Risk Transfers." *Critical Perspectives on Accounting*, 11 (2000), 515–530.

Bergstresser, D.; M. Desai; and J. Rauh. "Earnings Manipulation, Pension Assumptions, and Managerial Investment Decisions." *Quarterly Journal of Economics*, 121 (2006). 157–195.
Black, F. "The Tax Consequences of Long-Run Pension Policy." *Financial Analysts Journal*, 36 (1980), 21–28.
Boyson, N. M.; N. Gantchev; and A. Shivdasani. "Activism Mergers." *Journal of Financial Economics*, 126 (2017), 54–73.
Boyson, N. M., and P. Pichler. "Hostile Resistance to Hedge Fund Activism." *Review of Financial Studies*, 32 (2018), 771–817.
Brav, A.; A. Dasgupta; and R. D. Mathews. "Wolf Pack Activism." *Management Science*, forthcoming (2022).
Brav, A.; W. Jiang; and H. Kim. "Hedge Fund Activism: A Review." *Foundations and Trends in Finance*, 4 (2009), 185–246.
Brav, A.; W. Jiang; and H. Kim. "The Real Effects of Hedge Fund Activism: Productivity, Asset Allocation, and Labor Outcomes." *Review of Financial Studies*, 28 (2015a), 2723–2769.
Brav, A.; W. Jiang; and H. Kim. "Recent Advances in Research on Hedge Fund Activism: Value Creation and Identification." *Annual Review of Financial Economics*, 7 (2015b), 579–595.
Brav, A.; W. Jiang; S. Ma; and X. Tian. "How Does Hedge Fund Activism Reshape Corporate Innovation?" *Journal of Financial Economics*, 130 (2018), 237–264.
Brav, A.; W. Jiang; F. Partnoy; and R. Thomas. "Hedge Fund Activism, Corporate Governance, and Firm Performance." *Journal of Finance*, 63 (2008), 1729–1775.
Choy, H.; J. Lin; and M. S. Officer. "Does Freezing a Defined Benefit Pension Plan Affect Firm Risk?" *Journal of Accounting and Economics*, 57 (2014), 1–21.
Cocco, J. F. "Corporate Pension Plans." *Annual Review of Financial Economics*, 6 (2014), 163–184.
Cocco, J. F., and P. F. Volpin. "Corporate Governance of Pension Plans: The UK Evidence." *Financial Analysts Journal*, 63 (2007), 70–83.
Coffee, J. C., and D. Palia. "The Wolf at the Door: The Impact of Hedge Fund Activism on Corporate Governance." *Annals of Corporate Governance*, 1 (2016), 1–94.
Comprix, J., and K. Muller. "Pension Plan Accounting Estimates and the Freezing of Defined Benefit Pension Plans." *Journal of Accounting and Economics*, 51 (2011), 115–133.
Coronado, J., and N. Liang. "The Influence of PBGC Insurance on Pension Fund Finances." In *Restructuring Retirement Risks*, D. Blitzstein, O. S. Mitchell, and S. P. Utkus, eds. New York: Oxford University Press (2006), 88–108.
Denes, M.; J. Karpoff; and V. McWilliams. "Thirty Years of Shareholder Activism: A Survey of Empirical Research." *Journal of Corporate Finance*, 44 (2017), 405–424.
Duan, Y.; E. S. Hotchkiss; and Y. Jiao. "Corporate Pensions and Financial Distress." Working Paper, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2550311 (2015).
Edmans, A., and C. G. Holderness. "Blockholders: A Survey of Theory and Evidence." In *Handbook of the Economics of Corporate Governance*, B. Hermalin and M. Weisbach, eds. Amsterdam, The Netherlands: Elsevier (2017), 541–636.
Feng, F. Z.; Q. Xu; and H. Zhu. "Caught in the Crossfire: How the Threat of Hedge Fund Activism Affects Creditors." Working Paper, University of Oklahoma (2016).
Frank, M. M. "The Impact of Taxes on Corporate Defined Benefit Plan Asset Allocation." *Journal of Accounting Research*, 40 (2002), 1163–1190.
Gantchev, N., and C. Jotikasthira. "Institutional Trading and Hedge Fund Activism." *Management Science*, 64 (2017), 2930–2950.
Gillan, S. L., and L. T. Starks. "The Evolution of Shareholder Activism in the United States." *Journal of Applied Corporate Finance*, 19 (2007), 55–73.
Graham, J. R., and L. F. Mills. "Using Tax Return Data to Simulate Corporate Marginal Tax Rates." *Journal of Accounting and Economics*, 46 (2008), 366–388.
Grennan, J. A. "A Corporate Culture Channel: How Increased Shareholder Governance Reduces Firm Value." Working Paper, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2345384 (2019).
Harper, J. T., and S. D. Treanor. "Pension Conversion, Termination, and Wealth Transfers." *Journal of Risk and Insurance*, 81 (2014), 177–198.
Huang, J. "Hedge Funds and Shareholder Wealth Gains in Leveraged Buyouts." Working Paper, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1086687 (2009).
Jiang, W.; T. Li; and D. Mei. "Influencing Control: Jawboning in Risk Arbitrage." *Journal of Finance*, 73 (2018), 2635–2675.
Jiang, W.; K. Li; and W. Wang. "Hedge Funds and Chapter 11." *Journal of Finance*, 67 (2012), 513–560.
Kieso, D. E.; J. J. Weygandt; and T. D. Warfield. *Intermediate Accounting*, Vol. 2, IFRS Edition. Hoboken, NJ: John Wiley & Sons (2010).

Kim, W.; W. Kim; and K. S. Kwon. "Value of Outside Blockholder Activism: Evidence from the Switchers." *Journal of Corporate Finance*, 15 (2009), 505–522.
Klein, A., and E. Zur. "The Impact of Hedge Fund Activism on the Target Firm's Existing Bondholders." *Review of Financial Studies*, 24 (2011), 1735–1771.
Krishnan, C. N. V.; F. Partnoy; and R. S. Thomas. "The Second Wave of Hedge Fund Activism: The Importance of Reputation, Clout, and Expertise." *Journal of Corporate Finance*, 40 (2016), 296–314.
Petersen, M. A. "Pension Reversions and Worker–Stockholder Wealth Transfers." *Quarterly Journal of Economics*, 107 (1992), 1033–1056.
Phan, H. V., and S. P. Hegde. "Pension Contributions and Firm Performance: Evidence from Frozen Defined Benefit Plans." *Financial Management*, 42 (2013), 373–411.
Pontiff, J.; A. Shleifer; and M. S. Weisbach. "Reversions of Excess Pension Assets After Takeovers." *Rand Journal of Economics*, 21 (1990), 600–613.
Rauh, J. D. "Investment and Financing Constraints: Evidence from the Funding of Corporate Pension Plans." *Journal of Finance*, 61 (2006), 33–71.
Rauh, J. D. "Risk Shifting Versus Risk Management: Investment Policy in Corporate Pension Plans." *Review of Financial Studies*, 22 (2009), 2687–2733.
Rauh, J. D.; I. Stefanescu; and S. P. Zeldes. "Cost Saving and the Freezing of Corporate Pension Plans." *Journal of Public Economics*, 188 (2020), 104211.
Rosett, J. G. "Do Union Wealth Concessions Explain Takeover Premiums? The Evidence on Contract Wages." *Journal of Financial Economics*, 27 (1990), 263–282.
Sharpe, W. F. "Corporate Pension Funding Policy." *Journal of Financial Economics*, 3 (1976), 183–193.
Sharpe, W. F., and J. L. Treynor. "The Principles of Corporate Pension Finance." *Journal of Finance*, 32 (1977), 627–638.
Shleifer, A., and L. H. Summers. "Breach of Trust in Hostile Takeovers." In *Corporate Takeovers: Causes and consequences*, A. J. Auerbach, ed. Chicago: University of Chicago Press (1988), 33–68.
Stefanescu, I.; Y. Wang; K. Xie; and J. Yang. "Pay Me Now (and Later): Pension Benefit Manipulation Before Plan Freezes and Executive Retirement." *Journal of Financial Economics*, 127 (2018), 152–173.
Stein, J. C. "Takeover Threats and Managerial Myopia." *Journal of Political Economy*, 96 (1988), 61–80.
Sundaresan, S., and F. Zapatero. "Valuation, Optimal Asset Allocation and Retirement Incentives of Pension Plans." *Review of Financial Studies*, 10 (1997), 631–660.
Sunder, J.; S. V. Sunder; and W. Wongsunwai. "Debtholder Responses to Shareholder Activism: Evidence from Hedge Fund Interventions." *Review of Financial Studies*, 27 (2014), 3318–3342.
Thomas, J. K. "Corporate Taxes and Defined Benefit Pension Plans." *Journal of Accounting and Economics*, 10 (1988), 199–237.
Uchida, K., and P. Xu. "US Barbarians at the Japan Gate: Cross–Border Hedge Fund Activism." Working Paper, University of Kitakyushu/Hosei University (2008).
United States Government Accountability Office. *High Risk: PBGC Insurance Programs.* GAO Report #17-317 (2017).