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Pay me now (and later): Pension benefit manipulation before plan freezes and executive retirement☆

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ABSTRACT

Large US firms modify top executives' compensation before pension-related events. Top executives receive one-time increases in pensionable earnings through higher annual bonuses one year before a plan freeze and one year before retirement. Firms also boost pension payouts by lowering plan discount rates when top executives are eligible to retire with lump-sum benefit distributions. Increases in executive pensions do not appear to be an attempt to improve managerial effort or retention and are more likely to occur at firms with poor corporate governance. These findings suggest that in some circumstances managers are able to extract rents through their pension plans.

1. Introduction

The high level of executive compensation at large public companies in the United States has long been the focus of policy debates. Compensation packages reflect outcomes from negotiations between top executives and board members, who have different incentives. Some of these incentives relate to managerial rent extraction, and others relate to shareholder value maximization via motivating and retaining managerial talent.[1] Most of these discussions focus

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[1] For example, Bertrand and Mullainathan (2001), Bebchuk and Fried (2004), and Morse, Nanda, and Seru (2011) argue that chief executive of-

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on equity-based compensation and on the link between pay and performance (Jensen and Murphy, 1990; Yermack, 1995; Edmans et al., 2009). Until recently, limited public data prevented in-depth empirical examination of executive pensions, which have been recognized for a long time as an important component of total compensation (Lazear, 1979; Lazear and Moore, 1984).[2]

In this study, we take advantage of recent improvements in the availability of pension data to investigate whether boards exercise discretion in determining pension benefit formula inputs for top executives in ways that advantage or harm shareholders. We show that boards increase pensionable earnings by temporarily raising bonuses the year before a pension plan is frozen or before a top executive retires. Firms also lower the discount rates used to compute lump-sum pension payouts in years in which top executives are eligible to retire and take such lump-sum payouts. These manipulations are more likely at firms with weak governance and do not appear to be related to incentive provision or managerial retention. Both of these findings are consistent with the managerial rent-seeking view of executive compensation. However, we also find that the compensation adjustments are made in a cost-effective manner, consistent with the shareholder value maximization view of executive compensation.

Most executive pensions are defined benefit (DB) pension plans, under which the sponsoring company promises to pay plan participants a fixed annual amount upon retirement. This amount is calculated as the product of a benefit factor (typically around 2%), the number of service years, and pensionable earnings (which include salaries and, almost always, annual bonuses and are typically averaged over the final three years of the employee's tenure). Suppose, for example, the benefit factor is 2%. An executive with an accumulated 25 years of service and pensionable earnings of $1 million has an annual pension benefit of $0.5 million ($=0.02 \times 25 \times 1$), which is 50% of pensionable earnings. Frequently, executives are permitted to take lump-sum payouts of their pension benefits upon retirement. The payout amount can be increased by using a lower discount rate to calculate the present value (PV) of future pension annuity payments.

In recent years, many companies have frozen their DB plans in anticipation of large long-run costs and increased contribution volatility. Once a plan is frozen, both the number of service years and the level of pensionable earnings stop growing (the so-called hard freeze). Thus, a plan participant's earned pension benefits remain at the same level for the rest of his or her tenure at the firm. In response, top executives can press the board to increase their pension benefits before the freeze to offset the loss of the expected benefit growth. One method for raising pension benefits ahead of a plan freeze is authorizing a one-time increase in pensionable earnings before the freeze takes effect.

Analyzing typical components of pensionable earnings one year before a plan freeze, we find no increase in salaries, but annual bonuses for top executives increase 18.5–29.3%, mainly due to the one-time awards of discretionary bonuses. Bonus increases and the resulting boosts in pension benefits averaged more than $400,000 per chief executive officer (CEO), which helps preserve 90% of the pension value had the plan freezes not occurred.

Our initial analysis of the annual bonuses paid to executives before plan freezes includes controls for commonly known economic determinants such as firm performance, risk, complexity, and executive responsibility (Core, Haulthausen, and Larcker, 1999). We include industry-year fixed effects (Gormley and Matsa, 2014) and, in alternative specifications, both year fixed effects and firm fixed effects to take into account various omitted factors that can affect bonus payouts (Graham et al., 2012). To address potential endogeneity concerns, we employ the propensity score matching (PSM) approach and confirm that top executives receive large bonus awards before plan freezes. The probability of a plan freeze is estimated using firm financial and pension characteristics (Petersen, 1994; Munnell and Soto, 2007; Beaudoin et al., 2010; Comprix and Muller, 2011).

We further compare equity awards with bonus payouts to top executives ahead of plan freezes. Equity awards typically outweigh bonus payouts, but, as Sundaram and Yermack (2007) show, equity awards almost never enter pension benefit calculations, while bonus payouts almost always do. If boards increase bonuses for reasons other than boosting pensions (e.g., motivating managerial effort), we would expect to observe similar, if not larger, increases in equity awards. If boards are primarily concerned with maximizing pensionable earnings, however, we should not observe such increases. In fact, we do not observe increases in equity awards before plan freezes, suggesting that boards increase annual bonuses with the explicit aim of increasing pension benefits ahead of a freeze.

In addition to studying plan freezes, we examine potential pension benefit manipulation before the retirement of top executives, at which point these executives' pension benefits are capped. We look at executives who depart the firm at age 65 or older (Weisbach, 1988) and examine bonuses and equity awards received by each retiring executive in the previous year. We find an average increase of $1.2 million in CEO annual bonuses one year before retirement at firms with DB plans, much larger than the comparable metric at firms without DB plans. We find no increases in equity awards for retiring top executives. These findings suggest that bonus increases before executive retirements are also related to pension benefits.[3]

ficer (CEO) entrenchment and ineffective board monitoring are the causes of increased CEO pay. In contrast, Rosen (1981), Murphy (2002), Murphy and Zabojnik (2004), Oyer (2004), Gabaix and Landier (2008), Edmans, Gabaix, and Landier (2009), Core and Guay (2010), Kaplan and Rauh (2010), Baranchuk, MacDonald, and Yang (2011), and Subramanian (2013) argue that the scarcity of managerial talent and the increasing importance of managerial skills largely explain observed changes in the level and dispersion of CEO pay.

[2] Sundaram and Yermack (2007) are the first to estimate the actuarial pension values for Fortune 500 chief executive officers. Sundaram and Yermack focus on the effect of executive pensions on corporate risk taking and CEO retirement decisions.

[3] "One of ExxonMobil's two supplemental pension plans for executives uses the three highest bonuses in the five years prior to retirement to calculate the executive's pension. As a result, a $US4m bonus to chief executive Rex Tillerson in 2008 helped push the total value of his pension

When lump-sum payouts are permitted at retirement, top executives can further enhance their retirement packages by convincing boards to approve lower plan discount rates for the calculation of the present value of pension benefits. To examine this possibility, we collect data on plan discount rates, the lump-sum distribution option, and the retirement age specified in DB plans for the period from 2006 to 2013. In years in which any top executive is eligible to retire with a lump-sum payout, the discount rate for the DB plan is, on average, lowered by 13 basis points (bps) to 14 bps relative to the benchmark rates.

These increases in executive pension benefits around pension-related events could be consistent with either the optimal contracting view or the managerial rent-seeking view of executive compensation. To identify the relative importance of these two views, we examine how governance mechanisms affect bonus increases and discount rate reductions around pension-related events. If changes in bonuses and plan discount rates are more consistent with optimal contracting, we expect to observe greater changes at firms with stronger board oversight and shareholder monitoring. If these changes are more consistent with managerial rent seeking, we expect to observe smaller changes at firms with stronger governance. We find that large bonus awards before plan freezes and executive retirement, as well as significant plan discount rate reductions at retirement, occur only at firms with weak governance, which is more with the managerial rent-seeking view.

We further provide evidence that casts doubt on the claims that boards could use large bonus awards before plan freezes to improve managerial effort or retention. Under the theory of incentive provision, we expect to observe larger bonuses when the freeze decision calls for greater managerial effort; that is, when the DB plan is more difficult to freeze and when freezing the plan is more important for the firm's success. Under the theory of retention improvement, we expect to observe larger bonuses before plan freezes when the managerial labor market is more competitive; that is, when top executives have better outside options (Parrino, 1997; Giroud and Mueller, 2010; Hoberg and Phillips, 2010; Hoberg et al., 2014; Cremers and Grinstein, 2014). Our empirical results do not support either theory.

Lastly, we find that the discount rates used to compute lump-sum payouts are lowered to a greater degree for retiring executives who would benefit more from such decreases, consistent with managerial rent seeking. The discount rates are lowered, on average, by 33 bps to 35 bps relative to the benchmark rates when retiring executives have large expected pension benefits (in the top quintile). This reduction in the discount rate translates into an average increase of nearly half a million dollars in the lump-sum payout for retiring CEOs.

Our paper shows that boards give favorable treatment to top executives in calculating their pension benefits to the detriment of shareholders. It adds to the literature examining how governance mechanisms affect executive compensation and other monitoring decisions (Weisbach, 1988; Core et al., 1999; and Faleye et al., 2011; among others). Our research expands the literature on problematic compensation practices (Hartzell et al., 2004; Yermack, 2006; Lie and Heron, 2007; Faulkender and Yang, 2010; Bizjak et al., 2011). We also contribute to the literature on annual bonuses going back more than 30 years (Murphy, 1985; Gaver and Gaver, 1998; Jensen and Murphy, 2011) and extend the new line of research started by Sundaram and Yermack (2007) that links executive pensions to annual compensation.[4]

Our research also adds to the literature examining opportunistic behavior in pension-related decisions. For example, prior research has shown that firms use lower expected rates of return for DB plans to reduce income before CEO option grants and higher expected rates of return to increase income before CEOs exercise stock options (Bergstresser et al., 2006) or sell shares in the open market (Comprix and Muller, 2006). Our findings complement the evidence that greater CEO interest in employee DB plans leads to higher funding levels and a lower probability of plan freezes (Begley et al., 2015).[5]

The remainder of the paper is organized as follows. Section 2 describes our data and provides summary statistics. Section 3 presents empirical results on bonus increases before pension freezes and executive retirement as well as the manipulation of plan discount rates when executives are eligible to retire with lump-sum benefit distribution. Section 4 determines whether managerial rent seeking or optimal contracting better explains our findings. Section 5 concludes.

2. Data description

Our sample starts with all firms covered by the Standard & Poor's (S&P) ExecuComp database (current and past S&P 1500 index components) from 2000 to 2013. Based on the annual pension table, 1,378 of the 2,807 ExecuComp firms offer DB plans to their employees (a positive value of PBPRO in Compustat). We further restrict our sample to firms that have plan-level information in Form 5500. We extract information on firm financials [from Compustat and the Center for Research in Security Prices (CRSP)], executive compensation, and an indicator for CEO (from the annual compensation table of ExecuComp). Our final sample is composed of 1,084 firms, which correspond to 13,850 executives and 61,831 executive year observations.

to $US31m from $US23m" (Wall Street Journal, 2009). Schultz (2011) includes more examples of opportunistic behavior related to pensions.

[4] For example, Cadman and Vincent (2015) show a positive correlation between DB pension benefits and excess annual compensation for CEOs. Gerakos (2010) finds that an additional dollar of pension benefits is associated with a decrease of 48 cents in pay. Kalyta (2009) shows income-increasing earnings management before CEO retirement if CEO pension is determined based on performance.

[5] Our research also contributes to the literature examining the effect of DB plans on corporate decisions. Bergstresser, Desai, and Rauh (2006) show that firms manipulate pension assumptions before mergers and acquisitions and earnings announcements. DB plans are also shown to affect corporate investment decisions (Rauh, 2006), choices of financial leverage (Shivdasani and Stefanescu, 2010), and the costs of debt (Edmans and Liu, 2011; Wei and Yermack, 2011; Choy, Lin, and Officer, 2014).

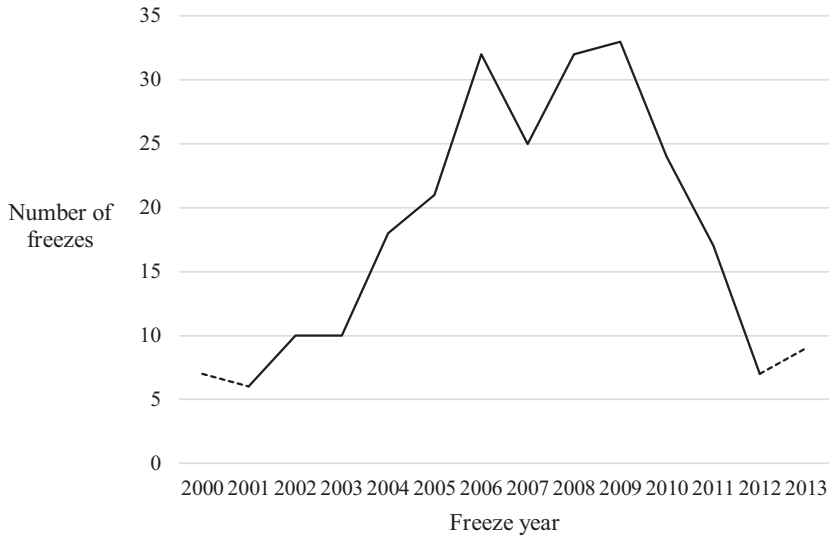

Fig. 1. Distribution of defined benefit (DB) plan freezes by year. The figure depicts the number of hard freezes of DB plans over the period from 2000 to 2013. The dashed lines reflect potentially incomplete observations. We extract the dates of hard freezes from plan descriptions in the attachments to Form 5500.

2.1. Plan freezes

We identify DB plan freezes from Form 5500, which is a mandatory filing at the plan level. Form 5500 includes information on the funding status of a plan and flags whether a plan is frozen in a given year. We focus on hard freezes, which entail a complete stop of pension accruals. We validate the freeze date by reading the plan description in the attachment to Form 5500. For the period from 2000 to 2013, 207 of the 1,084 firms in our sample froze 251 of their DB plans. Because Form 5500 is not publicly released by the Internal Revenue Service (IRS) for two years following the filing, our sample of plan freezes for 2012 and 2013 is incomplete. Our sample of freezes that occurred in 2000 and 2001 is also incomplete, because the disclosure of plan freezes became mandatory only in 2002. Fig. 1 depicts the annual distribution of these plan freezes, which peaked in 2009.

We report the summary statistics on firm and pension characteristics in Table 1, comparing the years immediately before a plan freeze with all other firm years. Freeze firms tend to have lower return on assets (ROA) and stock returns (contemporaneous and lagged), a lower market-to-book ratio, negative net income and no income increases, and more volatile stock returns and cash flows. One year before the freeze, 83.3% of the freeze firms' pension plans were underfunded in aggregate (Compustat PPLAO/PBPRO is less than one), in contrast to 79.2% for the remaining firm years. Freeze firms tend to have larger pension plans and greater anticipated savings on average (with the projected pension benefit obligation equal to 20.3% of the firm's total assets, compared with 15.6% for the remaining firm years). Moreover, 8.9% of the freeze firms offer only unionized DB plans, compared with 14.6% for the remaining firm years, which is consistent with the notion that freezing unionized plans is more difficult. Overall, firms that freeze their DB plans perform poorly and can have difficulties meeting funding requirements.

2.2. Retirement conditions and plan discount rates

Top executives typically participate in two types of DB plans: (1) qualified plans, which allow tax-deductible contributions but cover annual benefits only up to the limit imposed by the IRS (e.g., $210,000 in 2016); and (2) supplemental executive retirement plans (SERPs), which cover the remaining pension benefits. Contributions made to SERPs are not tax deductible, and SERPs are typically unfunded. For top executives of large US companies, SERP benefits are typically much larger than qualified plan benefits.

For most firms in our sample, information on plan discount rates, the lump-sum distribution option, and retirement conditions is extracted from proxy statements (in the Retirement Benefits or Pension Benefits section of the DEF-14A filings). For a subset of smaller firms, the information comes from 10-K or 10-K/A filings. The number of accredited service years and the present value of pension benefits are contained in the pension benefits table of ExecuComp. Firms began disclosing these details of their pension plans on December 15, 2006, when the Securities and Exchange Commission enhanced disclosure requirements on executive compensation. Thus, we examine plan discount rates over the period from 2006 to 2013.

Information on the retirement condition and the lump-sum distribution option is available for 5,563 firm years, which correspond to 873 unique firms. Of these, 5,139 firm years have qualified plans and 4,988 have SERPs. For qualified plans (SERPs), the threshold at which executives can receive 100% of pension benefits without penalty is defined based on a single age in 83.0% (80.7%) of the observations and a combination of age and service years in 13.0%

Table 1
Summary statistics on firm and pension characteristics before plan freezes.

This table reports summary statistics of firm and pension characteristics on subsamples based on an indicator, *Pre freeze*, which equals one if the firm freezes its defined benefit (DB) pension plan in the next fiscal year and zero otherwise. Panel A reports summary statistics of firm characteristics. *Sales (ln) lag* is the natural logarithmic transformation of lagged *Sales*. *ROA* is the ratio of earnings before interest and taxes (EBIT) to total assets. *Negative income* equals one if the firm's net income is negative and zero otherwise. *Income increase* equals one if the firm's net income increases from last year and zero otherwise. *Return* is the stock return (including distribution and reinvestment) during the current fiscal year. *Return volatility* is the volatility of monthly stock returns over the current fiscal year. *M/B* is the ratio of the market value to the book value of common equity. *Leverage* is the ratio of the sum of long- and short-term debt to total assets. *Total assets (ln) lag* is the natural logarithmic transformation of lagged total assets. *Cash flow volatility* is the median value of cash flow volatility for firms in the same two-digit standard industrial classification industry, in which firm cash flow volatility is the standard deviation of a firm's cash flow (scaled by total assets) in the previous ten years. Panel B reports summary statistics of pension characteristics. *Funding%* is the ratio of the company's overall pension assets to pension obligations (Compustat items: PPLAO/PBPRO), and *Underfunded* is an indicator that equals one if *Funding%* is less than one and zero otherwise. *Relative pension size* is the ratio of the projected pension benefit obligation to total assets. *Unionized* equals one if all DB plans of a firm are unionized and zero otherwise.

	Pre freeze = 1			*Pre freeze* = 0			Mean	*t*-test	Median	Median test
Variable	*N*	Mean	Median	*N*	Mean	Median	Difference	*p*-value	Difference	*p*-value
Panel A: Firm characteristics										
Sales (ln) lag	251	8.375	8.312	10,081	7.979	7.864	0.397	.000	0.448	.000
ROA	251	0.071	0.064	10,081	0.086	0.077	−0.015	.000	−0.013	.006
ROA lag	251	0.075	0.067	10,081	0.087	0.078	−0.012	.005	−0.011	.142
Negative income	251	0.195	0.000	10,081	0.139	0.000	0.056	.011	0.000	.011
Income increase	251	0.558	1.000	10,081	0.608	1.000	−0.050	.111	0.000	—
Return	251	0.060	0.038	10,081	0.110	0.088	−0.050	.051	−0.050	.225
Return lag	251	0.083	0.032	10,081	0.107	0.078	−0.023	.364	−0.046	.025
Return volatility	251	0.109	0.087	10,081	0.100	0.086	0.009	.013	0.001	.749
M/B	251	2.279	1.848	10,081	2.618	1.929	−0.339	.079	−0.080	.482
Leverage	251	0.253	0.231	10,081	0.262	0.250	−0.009	.373	−0.019	.064
Total assets (ln) lag	251	8.777	8.558	10,081	8.423	8.284	0.354	.001	0.274	.025
Cash flow volatility	251	0.040	0.037	10,081	0.037	0.036	0.002	.079	0.001	.213
Panel B: Pension characteristics										
Underfunded	251	0.833	1.000	9,997	0.792	1.000	0.041	.114	0.000	—
Funding%	251	0.828	0.816	9,997	0.850	0.820	−0.022	.150	−0.004	.848
Relative pension size	251	0.203	0.120	10,081	0.156	0.099	0.047	.000	0.022	.180
Unionized	237	0.089	0.000	9,117	0.146	0.000	−0.057	.013	0.000	.013

(14.3%) of the observations. The remaining 4.0% (5.0%) of observations have multiple retirement ages or age and service year combinations applied to different plans or executives. For qualified plans in which retirement is defined based on a single age, the most popular retirement ages are 65 (71.6% of the observations), 62 (19.5%), and 60 (6.9%), with a minimum of 55, a maximum of 66, and an average of 63.9 years. For SERPs, the most popular retirement ages are 65 (62.1% of the observations), 62 (21.6%), and 60 (12.2%), with a minimum of 55, a maximum of 72, and an average of 63.5 years. Fig. 2, Panel A, shows the number of firms with any top executive at or above the retirement age for pension purposes, by plan type and year.

The discount rates for DB plans involving top executives are disclosed in the DEF-14A or 10-K or 10-K/A filings for 2,820 firm years. We fill in missing discount rates with the weighted-average discount rates over all of the firm's DB plans listed in the 10-K filings (PBARR in Compustat). The mean and median discount rates are, respectively, 5.41% and 5.60% for qualified plans and 5.33% and 5.50% for SERPs (untabulated). A lump-sum distribution option is available for 64% of the plans. The discount rate for lump-sum distribution differs from that for annuity payments in 270 qualified plans and 451 SERPs. Overall, plans allowing lump-sum distribution tend to have lower discount rates, and the gap between the lump-sum and annuity rates is larger for SERPs than for qualified plans.

Under the 2009 Financial Accounting Standards Board Accounting Standards Codification 715: Compensation—Retirement Benefits, employers have considerable discretion in determining the discount rates for DB plans. However, their choice is subject to some constraints. For example, discount rates for annuity payouts are often linked to the rates implicit in annuity contracts at which the pension obligations can be effectively settled, and these annuity rates are linked to high-quality bond rates (Naughton, 2015). Fig. 2, Panel B, shows that the average discount rates for DB plans generally lie between two high-quality corporate bond rates [Moody's AA corporate bond index rates (Moody's AA rate) and the Composite Corporate Bond Rate (CCBR)], with SERP rates below qualified plan rates.

3. Empirical analyses

This section details the empirical methodology and results.

3.1. Bonus increases before plan freezes

Pension freeze decisions are often negotiated with employees, retirees, and their unions over an extended period. When these parties get close to a resolution, the plan freeze is fully anticipated by top executives, thus giving them the opportunity to press the board to counterbalance the foregone growth in benefit accruals.

To make top executives whole, boards could credit them with additional service years, increase salaries, or award large bonuses before a plan freeze. However, leapfrogging service years rarely happens, perhaps because it is more controversial and easily detectable. Increasing

Panel A: Distribution of executive retirement

Panel B: Average plan discount rates and benchmark rates

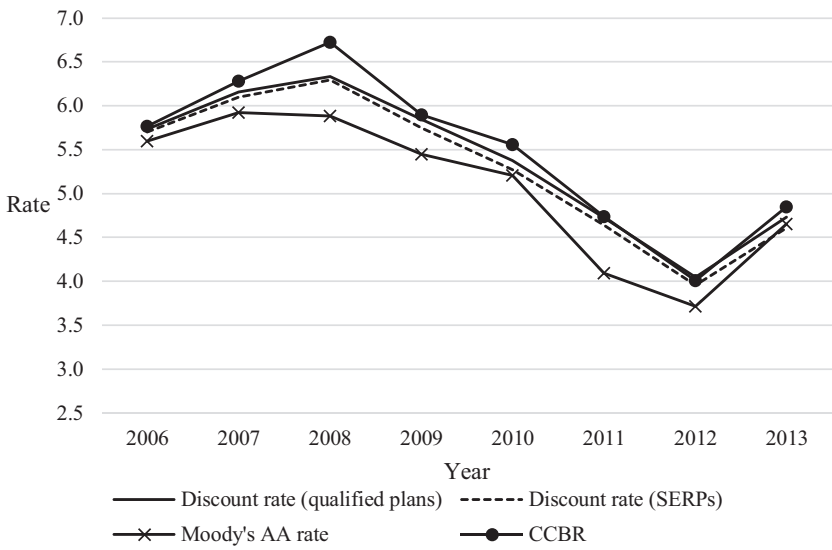

Fig. 2. Distribution of executive retirement and plan discount rates by year. Panel A depicts the distribution of *Retirement* over the period from 2006 to 2013. *Retirement* is set to one if any top executive of a firm meets the retirement condition specified in a defined benefit plan, under which 100% of pension benefits can be paid out without penalty. Panel B depicts the comparison of the average discount rates for qualified plans and supplemental executive retirement plans (SERPs) with two benchmark rates during 2006–2013. We use the Moody's AA corporate bond index and the Internal Revenue Service's Composite Corporate Bond Rate (CCBR) as the benchmark rates.

salaries is more costly to the firm, as it is mostly irreversible, and target bonus payout and severance pay are often expressed as multiples of salaries. Salary increases can also exceed the one-million-dollar cap for tax deductions. Furthermore, salary increases perhaps are not feasible if the freeze decision is made later in the (pre-freeze) year.

Increases in annual bonuses are less costly than identical increases in salaries because they are one-time awards. Such increases can be implemented by raising annual incentive pay or awarding discretionary bonuses. Discretionary bonuses are awarded upon the discretion of the board, giving it the latitude to maneuver if the freeze decision is made later in the year.[6] In Sections 3.1.1–3.1.3, we

[6] Robert Keegan joined Goodyear Tire & Rubber Company in 2000 and obtained a service credit of 2.5 years for each year of his employment for pension purposes. Mr. Keegan received an annual bonus totaling $10.44 million in 2006. In 2007, the year before the company froze its DB plans, his bonuses totaled $12.3 million (of which $3.5 million was discretionary

examine whether boards increase annual bonuses for top executives before plan freezes. In Section 3.1.5, we investigate whether boards also increase salaries. We further examine annual incentive pay and discretionary bonuses separately using a subsample in which the decomposition of annual bonuses is feasible.

3.1.1. Univariate analysis

We report the summary statistics on executive compensation in Panel A of Table 2. We expect firms that freeze their DB plans to pay lower compensation to top executives because of poor performance. We find that, to the contrary, executive annual bonuses are 15.3% greater on average and 23.2% greater at the median in the year before plan freezes. Salaries are 7.8% greater on average and 9.7% greater at the median. Equity awards before plan freezes are similar to equity awards in other firm years.

3.1.2. Multivariate regressions

We next run panel regressions using Ln $(1+Bonus)$ in thousands of dollars as the dependent variable and the anticipated freeze event occurring one year ahead, *Pre freeze*, as our main independent variable. We test whether the level of executive annual bonuses is abnormally high in the year before a plan freeze. Our baseline specification is

$$Bonus_{ijt} = \alpha + \beta_1 \times Pre\ freeze_{it} + \gamma_1 \times Salary_{ijt} + \gamma_2 \times X_{i(j)t\ or\ t-1} + \eta_t + \mu_i + \varepsilon_{ijt}, \quad (1)$$

where subscript i refers to the firm, j refers to the executive, and t refers to the year.

Our specification includes control variables commonly known to affect annual bonuses. We include *Salary* because target bonuses are typically expressed as multiples of base salary and because it helps us distinguish non-CEO top executives at the same firm. We include an indicator for the CEO because CEOs have greater responsibility and receive bigger bonuses than do other executives in general. Following Core et al. (1999), we include firm size (lagged *Sales*), performance [current and lagged *ROA*, calculated as earnings before interest and taxes (*EBIT*) divided by total assets, and current and lagged stock *Return*], stock *Return volatility*, market-to-book ratio of equity (*M/B*), and *Leverage*. We further include two indicators related to recent income levels: *Negative income* and *Income increase* (Gaver and Gaver, 1998; Jackson et al., 2008).

We report the results in Panel B of Table 2. Columns 1 and 2 include all firms offering DB plans. Columns 3 and 4 include firms that froze their DB plans over our sample period, which allows us to compare executive bonus levels around the freeze event conditional on the freeze decision. Columns 1 and 3 include [two-digit standard industry classification (SIC)] industry-year fixed effects to control for unobserved time-varying industry characteristics. Columns 2 and 4 include year fixed effects and firm fixed effects to control for time trends and unobserved time-invariant firm characteristics that can affect executive bonuses. Standard errors are clustered at the firm level.

The coefficient estimate of *Pre freeze* is positive and statistically significant in all regressions, and the results are stronger for firms that froze their pension plans. Under Specification 4, boards award, on average, 29.3% higher annual bonuses to top executives in the year before a plan freeze, after controlling for other potential determinants of annual bonuses. The coefficient estimate is statistically significant at the 1% level.[7] Control variables have the expected signs and economic magnitude. For example, for an increase of 1% in base salary, annual bonuses increase by 1.1% on average. Bonuses increase with *ROA, Income increase*, and current and lagged stock *Return,* and they decrease with *Negative income, Return volatility*, and *M/B*.

Using the median value of each measure for CEOs in our sample, we estimate that an increase of 0.293 in Ln $(1+Bonus)$ before a plan freeze increases CEO compensation by $425,377, of which about half is due to the increase in the bonus payout and the remainder is the resulting increase in the present value of pension benefits. Our analysis indicates that top executives preserve 90% of the pension value they would have received in the absence of the plan freeze (and bonus increases).[8] Because our calculation leaves out alternative pensions awarded to top execu-

bonuses). Keegan's bonuses were only $4.6 million in 2008. "Retirement benefits, including those provided through a SERP, are a critical component of an executive's overall compensation program and are essential to attracting, motivating and retaining talented executives with a history of leadership" (2007 proxy statement, http://www.sec.gov/Archives/edgar/data/42582/000095015207001972/l23581adef14a.htm#126).

[7] ExecuComp modified the definition of annual bonuses in December 2006. The more comparable terms are the sum of BONUS and the long-term incentive payout (LTIP) before December 15, 2006 and the sum of BONUS and NONEQ_INCENT afterward. If we use the sum of BONUS and LTIP to measure annual bonuses prior to December 15, 2006, the coefficient estimate of *Pre freeze* is 0.246, slightly smaller than the 0.293 reported in column 4 of Table 2. This finding is not surprising, because only about 4% of DB plans consider LTIP as pensionable earnings (Sundaram and Yermack, 2007). Thus, the LTIP portion adds noises to the analysis of bonus increases for pension purposes. Greater bonus awards perhaps are not limited to the year prior to the pension freeze. If pension benefits are calculated based on the values of base salary and annual bonuses over the preceding three years, for example, top executives have incentives to increase their bonuses as early as three years before the pension freeze. This could occur even though the freeze decision is more uncertain more than 12 months before a freeze. Moreover, executive bonuses can remain at the increased level after the freeze. We examine annual bonuses awarded in the period from three years before to two years after each plan freeze and find that increases in annual bonuses occurred at just one point: the year before a freeze. Bonus awards revert to their expected level during the freeze year (untabulated). This finding helps link increases in executive bonuses to pension benefits.

[8] Suppose a benefit factor of 0.02, a nominal discount rate of 5.5%, a retirement age of 65, a three-year average salary of $892,133, and a three-year average bonus before any increase of $828,836 (sample medians). Further, suppose that one year before the freeze, a CEO is 56 years old, has 18 years of service, and Ln $(1+Bonus)$ of 6.512. An increase of 0.293 in Ln $(1+Bonus)$ corresponds to $229,088 $(= (e^{6.805} - e^{6.512}) \times 1,000)$, which in turn increases the annual pension benefit payment by $27,491 $(= 0.02 \times 18 \times 229{,}088 / 3)$. Using a PV factor of 7.17 (which takes into account the official mortality rates for males), the increase in the present value of the CEO's pensions totals $196,289. Thus, the total compensation increase is $425,377 $(= 229{,}088 + 196{,}289)$ valued one year prior to the freeze. Assume that salaries and bonuses grow at 4% per year for the CEO (sample median) and that the CEO leaves the firm three years after the pension freeze (sample median). We estimate that the freeze would have reduced the present value of benefits by 18% had the bonus increase not occurred. Increases in bonuses and the resulting increases in pension value recover about 46% of the loss. The resulting ratio of the sum of the increases in bonuses and the present value of pension benefits with

Table 2
Executive annual bonuses before plan freezes.

Panel A reports the results of the univariate analysis of annual bonuses, equity awards, and salaries, comparing the year prior to a plan freeze with other firm years. *Pre freeze* is one if the firm is freezing its pension plans the following fiscal year and zero otherwise. Because there are cases of zero salary, bonus payouts, and equity awards, we add one (in thousands of dollars) and take the natural logarithmic transformation of (1 + *Salary*), (1 + *Bonus*), and (1 + *Equity*). Panel B reports the results of regressing executive bonuses on a forthcoming plan freeze and other firm and executive characteristics. We estimate the ordinary least squares regression

$$Bonus_{ijt} = \alpha + \beta_1 \times Pre\ freeze_{it} + \gamma_1 \times Salary_{ijt} + \gamma_2 \times X_{i(j)t\ or\ t-1} + \eta_t + \mu_i + \varepsilon_{ijt}.$$

All control variables are defined in Table A1. Columns 1 and 2 report the regression results for all firms with defined benefit pensions, and Columns 3 and 4 restrict the sample to firms that implemented pension freezes during our sample period. We control for industry-year fixed effects in Columns 1 and 3, and we control for year fixed effects and firm fixed effects in Columns 2 and 4. Robust standard errors in parentheses are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Panel A: Univariate analysis

	Pre freeze = 1			*Pre freeze* = 0			Mean	*t*-test	Median	Median test
Variable	*N*	Mean	Median	*N*	Mean	Median	Difference	*p*-value	Difference	*p*-value
Bonus (ln)	1,505	5.201	5.860	60,326	5.049	5.628	0.153	.011	0.232	.000
Equity (ln)	1,472	5.441	6.278	59,100	5.382	6.218	0.059	.433	0.060	.267
Salary (ln)	1,505	6.099	6.111	60,326	6.021	6.014	0.078	.000	0.097	.000

Panel B: Multivariate regressions

	Dependent variable: *Bonus (ln)*			
	All firms with defined benefit pension plans		Firms that froze defined benefit pension plans	
Variable	(1)	(2)	(3)	(4)
Pre freeze	.185**	.239***	.231**	.293***
	(0.092)	(0.087)	(0.103)	(0.087)
Salary (ln)	1.149***	1.095***	1.289***	1.087***
	(0.057)	(0.051)	(0.110)	(0.107)
Sales (ln) lag	.263***	0.053	.258***	−0.175
	(0.025)	(0.077)	(0.048)	(0.123)
ROA	6.924***	8.453***	8.914***	12.250***
	(0.638)	(0.716)	(1.358)	(1.236)
ROA lag	−4.189***	−3.387***	−6.855***	−5.610***
	(0.586)	(0.578)	(1.190)	(1.048)
Negative income	−.502***	−.434***	−.522***	−.395***
	(0.076)	(0.074)	(0.137)	(0.133)
Income increase	.356***	.416***	.240***	.327***
	(0.040)	(0.038)	(0.091)	(0.081)
Return	.961***	.840***	1.002***	.811***
	(0.057)	(0.052)	(0.116)	(0.102)
Return lag	.401***	.327***	.487***	.337***
	(0.046)	(0.048)	(0.087)	(0.093)
Return volatility	−3.397***	−3.839***	−4.955***	−5.037***
	(0.566)	(0.548)	(1.077)	(1.102)
M/B	−0.007	−.025***	0.000	−.033**
	(0.006)	(0.007)	(0.013)	(0.013)
Leverage	0.159	−0.371	0.315	−0.569
	(0.190)	(0.260)	(0.410)	(0.538)
CEO	−0.014	0.021	−.222**	−0.066
	(0.049)	(0.045)	(0.094)	(0.093)
Constant	−4.159***	−2.245***	−4.808***	−0.000
	(0.316)	(0.605)	(0.545)	(1.028)
Industry-year fixed effects	Yes	No	Yes	No
Year fixed effects	No	Yes	No	Yes
Firm fixed effects	No	Yes	No	Yes
Number of observations	61,831	61,831	16,845	16,845
Adjusted *R*-squared	0.368	0.448	0.433	0.440

tives after DB plans are frozen [e.g., 401(k) plans], we likely underestimate the preservation ratio of executive pension benefits.

Firms that freeze their pension plans could differ systematically from those that do not, and these differences can lead to the observed difference in bonus awards. Specifications 3 and 4 include only firms that chose to freeze their pension plans. In all specifications, we include fixed effects to account for omitted variables that can affect annual bonus awards. Moreover, we find slightly

a freeze to the present value of pension benefits without the freeze (and bonus increases) is 90%.

stronger results using executive fixed effects instead of firm fixed effects (Specifications 2 and 4). The coefficient of *Pre freeze* becomes 0.256 and 0.305, respectively (untabulated).[9] Even though some time-variant and firm-specific omitted factors could affect both the plan freeze and bonus award decisions, firms freezing their DB plans tend to perform poorly and their executives are expected to receive smaller bonuses. Thus, any omitted performance-related factors should be biased against finding larger bonus awards immediately before plan freezes.

3.1.3. Propensity score matching model

To further address endogeneity concerns, we use the PSM approach to identify control firms that had a similar propensity to freeze their DB plans but did not do so. We measure the effect of plan freezes on executive bonuses using the pay difference between freeze firms and their matching counterparts.

To predict the likelihood of a plan freeze, we use firm size, accounting and stock performance, market-to-book ratio, and financial leverage. Because Petersen (1994) shows that firms with a more volatile cash flow are more likely to freeze DB plans, we also include cash flow volatility. We calculate firm-level cash flow volatility using each firm's annual data over the previous ten years and take the median volatility level for firms in the same industry (two-digit SIC code) in the year prior to the plan freeze. Because the extent to which a pension plan is underfunded is an important determinant of the freeze decision, we further include the *Underfunded* indicator and the overall funding ratio of a firm's DB plans (Comprix and Muller, 2011). Moreover, *Relative pension size* is a predictor of the freeze because freezing a relatively large plan has a stronger effect on cash flows (Munnell and Soto, 2007). Lastly, we include year fixed effects and industry fixed effects to control for potential freeze waves and omitted industry characteristics that can affect the freeze decision. Standard errors are clustered at the firm level. Because factors that affect plan freeze decisions could have changed after the Great Recession (e.g., firms start paying more attention to risks), we run the first-stage probit regression separately for plan freezes that occurred during 2000–2007 and 2008–2013.

Panel A in Table 3 reports the regression result of the first-stage probit model. The dependent variable is one if a firm freezes its DB plan the following year and zero otherwise. We find that, for both sub periods, the coefficient of the *Relative pension size* is positive and statistically significant at the 5% level, consistent with the findings of Munnell and Soto (2007) and Rauh et al. (2016). Before the Great Recession, the decision to freeze DB plans is associated with larger size and lower growth potential. During and after the Great Recession, cash flow volatility appears to become the important factor.

Propensity score matching is within the same year and two-digit SIC industry without replacement. We find, for each freeze event, the firm with the nearest propensity score that does not freeze its DB plan that year. We use a caliper of 0.25 times the standard deviation of the estimated propensity scores (approximately 0.6%), which allows us to generate 205 matched pairs for the 251 freeze events, corresponding to 1,232 executive years for the treated (freeze) group and 1,197 executive years for the control group. Treated and control firms are comparable

Table 3
Executive annual bonuses before plan freezes: propensity score matching (PSM) approach.

This table reports the results of a PSM model for firms that choose to freeze pensions versus firms that do not. Matching is within the same two-digit standard industrial classification (SIC) code industry in the same year. The caliper is 0.25 times the standard deviation of estimated propensity scores (approximately 0.6%). Panel A reports the first-stage probit model that estimates the propensity to freeze a defined benefit plan based on various firm-level characteristics. Taking into account that determinants of plan freeze decisions can differ before and after the Great Recession, we divide our sample period into 2000–2007 and 2008–2013 and report the estimations in Columns 1 and 2, respectively. We control for year fixed effects and industry fixed effects. Panel B reports the second-stage regression of baseline specifications on treated and control groups. We control for year fixed effects and industry (two-digit SIC industry) fixed effects in Column 1 and industry-year fixed effects in Column 2. All variables are described in Table A1. Standard errors in parentheses are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Panel A: First-stage probit model

	Dependent variable: *Pre freeze*	
Variable	2000–2007 (1)	2008–2013 (2)
Total assets (ln) lag	.077***	0.029
	(0.029)	(0.032)
ROA	−1.332	−1.358
	(1.293)	(1.244)
ROA lag	−0.197	0.266
	(1.325)	(1.121)
Return	−0.028	−0.113
	(0.132)	(0.135)
Return lag	0.145	−0.201
	(0.118)	(0.127)
M/B	−.026*	0.012
	(0.014)	(0.015)
Leverage	0.078	−0.353
	(0.312)	(0.274)
Cash flow volatility	9.862	16.205**
	(7.777)	(7.750)
Underfunded	0.134	−0.096
	(0.148)	(0.176)
Funding%	0.072	−0.087
	(0.260)	(0.335)
Relative pension size	.510**	.419**
	(0.203)	(0.204)
Constant	−3.115***	−2.755***
	(0.869)	(0.978)
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Number of observations	5,560	3,867
Pseudo *R*-squared	0.092	0.074

(*continued on next page*)

[9] The bonus increase results are similar if we examine only one pension freeze per firm, either the earliest freeze or the freeze of the largest DB plan. We further examine whether freezing SERPs (along with qualified plans) provides stronger incentives for management to increase annual bonuses. In our sample, 94 out 251 plan freezes involve SERP freezes. We add an indicator of *SERP Freeze* and *SERP Freeze* × *Pre freeze* into Eq. (1). Under Specifications 2 and 4 of Table 3, the coefficient estimates of *Pre freeze* are 0.235 and 0.298, and they are statistically significant at the 5% level and 1% level, respectively. The coefficient estimates of *SERP Freeze* × *Pre freeze* are not statistically different from zero (untabulated).

Table 3 (*continued*)

Panel B: Second-stage ordinary least squares regression

	Dependent variable: *Bonus (ln)*	
	2000–2013	
Variable	(1)	(2)
Pre freeze	.334**	.331**
	(0.153)	(0.140)
Salary (ln)	1.323***	1.323***
	(0.174)	(0.162)
Sales (ln) lag	.201***	.299***
	(0.074)	(0.085)
ROA	.082*	4.356
	(3.180)	(3.210)
ROA lag	−1.430	1.131
	(3.059)	(3.226)
Negative income	−.642*	−0.138
	(0.351)	(0.404)
Income increase	.498**	.569**
	(0.215)	(0.230)
Return	.954***	.684**
	(0.321)	(0.332)
Return lag	0.367	0.196
	(0.296)	(0.286)
Return volatility	−4.911**	−2.788
	(2.451)	(2.649)
M/B	0.041	0.036
	(0.036)	(0.038)
Leverage	−0.283	−0.583
	(0.699)	(0.802)
CEO	−.283*	−.291**
	(0.147)	(0.140)
Constant	−4.454***	−4.926***
	(1.116)	(1.219)
Year fixed effects	Yes	No
Industry fixed effects	Yes	No
Industry-year fixed effects	No	Yes
Number of observations	2,429	2,429
Adjusted *R*-squared	0.377	0.467

in all determinants of plan freezes. One year before a plan freeze, the mean and median executive bonuses are larger than those in matched firm years by 24.8% (p-value = .012) and 9.7% (p-value = .216), respectively (untabulated).

Using the matched sample, we run a multivariate regression of annual bonuses on the pension freeze indicator, *Pre freeze*, and all control variables listed in Table 2. As shown in Panel B of Table 3, the coefficient of *Pre freeze* is 0.334 for the specification with year fixed effects and industry fixed effects and 0.331 for the specification with industry-year fixed effects. Both are statistically significant at the 5% level.[10] We obtain similar results using calipers of 0.1% and 1%. Overall, the PSM results confirm our findings under the ordinary least squares specifications, showing that boards increase executive bonuses one year prior to plan freezes.

[10] We also run the second-stage regressions separately for freezes that occurred during 2000–2007 and 2008–2013. We find stronger results for freezes that occurred during 2000–2007 (the coefficient estimates of *Pre freeze* are about 0.5) and similar results for freezes occurred in the later period if we exclude 2009 (which coincides with smaller bonuses awarded at the height of the recession in 2008). Furthermore, the coefficient estimates for *Pre freeze* are about 0.5 (and statistically significant) if we restrict our sample to discretionary bonuses for freezes that occurred during 2008–2013 (untabulated).

Table 4

Equity awards before plan freezes.

This table reports the results of regressing executive equity awards on a forthcoming pension plan freeze as well as other firm and executive characteristics. We estimate the ordinary least squares regression

$$Equity_{ijt} = \alpha + \beta_1 \times Pre\ freeze_{it} + \gamma_1 \times Salary_{ijt} + \gamma_2 \times X_{i(j)t\ or\ t-1} + \eta_t + \mu_i + \varepsilon_{ijt}.$$

The variable *Pre freeze* is one if the firm is freezing its pension plans the following fiscal year and zero otherwise. Because there are cases of zero equity awards, we add one (in thousands of dollars) and take the natural logarithmic transformation of (1 + *Equity*). The remaining variables are defined in Table A1. Columns 1 and 2 report the regression results for all firms with defined benefit pensions, and Columns 3 and 4 restrict the sample to firms that implemented pension freezes during our sample. We control for industry-year fixed effects in Columns 1 and 3. We control for year fixed effects and firm fixed effects in Columns 2 and 4. Robust standard errors in parentheses are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: *Equity (ln)*			
	All firms with defined benefit pension plans		Firms that froze defined benefit pension plans	
Variable	(1)	(2)	(3)	(4)
Pre freeze	−0.183	−0.149	−.220*	−0.144
	(0.132)	(0.111)	(0.129)	(0.110)
Salary (ln)	1.438***	1.534***	1.285***	1.350***
	(0.066)	(0.058)	(0.119)	(0.102)
Sales (ln) lag	.369***	.210***	.399***	0.164
	(0.031)	(0.078)	(0.054)	(0.149)
ROA	1.037	0.498	1.322	0.424
	(0.653)	(0.631)	(1.710)	(1.285)
ROA lag	1.831***	1.135**	2.273*	1.470
	(0.596)	(0.565)	(1.351)	(1.185)
Negative income	0.021	0.007	.283*	0.149
	(0.075)	(0.065)	(0.160)	(0.114)
Income increase	0.029	0.046	.145*	.154**
	(0.043)	(0.038)	(0.086)	(0.072)
Return	.120*	.162***	.250**	.207**
	(0.065)	(0.056)	(0.121)	(0.095)
Return lag	0.088	.186***	0.168	.234**
	(0.061)	(0.052)	(0.116)	(0.097)
Return volatility	−1.509**	−2.248***	−0.793	−2.905***
	(0.621)	(0.519)	(1.057)	(0.915)
M/B	.034***	.020**	0.017	0.017
	(0.010)	(0.009)	(0.017)	(0.011)
Leverage	−0.327	−0.466	−.878*	−0.509
	(0.247)	(0.330)	(0.480)	(0.548)
CEO	.408***	.325***	.532***	.490***
	(0.057)	(0.052)	(0.108)	(0.098)
Constant	−6.450***	−5.895***	−5.858***	−4.392***
	(0.333)	(0.669)	(0.636)	(1.302)
Industry-year fixed effects	Yes	No	Yes	No
Year fixed effects	No	Yes	No	Yes
Firm fixed effects	No	Yes	No	Yes
Number of observations	60,572	60,572	16,526	16,526
Adjusted *R*-squared	0.286	0.393	0.304	0.359

3.1.4. Equity awards before plan freezes

The increases in annual bonuses prior to a plan freeze could be driven by omitted factors that are not captured by the fixed effect models or the PSM model. We next test whether an impending pension freeze is associated with more generous equity awards. According to Sundaram and Yermack (2007), only 4% of DB plans include equity awards in the calculation of pension benefits. Thus, large equity awards before a plan freeze do not typically help increase

Table 5
Methods of increasing pensionable earnings before plan freezes.

This table reports the results of examining different approaches for increasing pensionable earnings. In Column 1, we regress base salary on a forthcoming pension plan freeze, as well as other firm and executive characteristics. We estimate the ordinary least squares regression

$$Salary_{ijt} = \alpha + \beta_1 \times Pre\ freeze_{it} + \gamma_1 \times X_{i(j)t\ or\ t-1} + \eta_t + \mu_i + \varepsilon_{ijt}.$$

In Columns 2 through 4, we use *Bonus (ln)*, *Non-equity incentive (ln)*, and *Discretionary bonus (ln)* as the dependent variable, respectively, and add *Salary (ln)* as a control variable. The regression in Column 1 covers the entire sample, and those in Columns 2 through 4 are over the subsample starting from December 15, 2006, when data on discretionary bonuses (ExecuComp item: BONUS) became available. *Pre freeze* is one if the firm is freezing its pension plans the following fiscal year and zero otherwise. Because there are cases of zero bonus and salary payouts, we add one to the raw data (in thousands of dollars) and take the natural logarithmic transformation of (1 + *Bonus*) and (1 + *Salary*). The remaining variables are defined in Table A1. All regressions are restricted to the sample of firms that implemented pension freezes during our sample period, and year fixed effects and firm fixed effects are included. Robust standard errors in parentheses are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable			
	Entire sample	Subsample starting on December 15, 2006		
Variable	*Salary (ln)* (1)	*Bonus (ln)* (2)	*Non-equity incentive (ln)* (3)	*Discretionary bonus (ln)* (4)
Pre freeze	−0.003	.354***	0.086	.459***
	(0.012)	(0.131)	(0.169)	(0.124)
Salary (ln)		1.318***	1.433***	−0.001
		(0.157)	(0.138)	(0.119)
Sales (ln) lag	.165***	−0.010	−0.446	.539*
	(0.023)	(0.224)	(0.311)	(0.277)
ROA	0.150	10.376***	11.257***	1.094
	(0.149)	(1.677)	(2.004)	(1.377)
ROA lag	−.307***	−3.662**	−6.030***	1.199
	(0.116)	(1.602)	(2.037)	(1.534)
Negative income	−0.012	−.539***	−.524**	−0.064
	(0.013)	(0.193)	(0.220)	(0.170)
Income increase	0.013	0.161	.237*	−0.142
	(0.008)	(0.113)	(0.131)	(0.105)
Return	0.016	.805***	.781***	.265**
	(0.010)	(0.145)	(0.167)	(0.126)
Return lag	.033***	.399***	.335**	0.190
	(0.010)	(0.134)	(0.146)	(0.123)
Return volatility	−.222**	−4.715***	−6.946***	0.533
	(0.111)	(1.495)	(1.696)	(1.407)
M/B	−0.001	−.044*	−0.029	−0.029
	(0.001)	(0.022)	(0.027)	(0.019)
Leverage	−0.096	−0.233	−1.541*	1.241**
	(0.059)	(0.772)	(0.890)	(0.585)
CEO	.735***	−0.088	−0.010	−.254***
	(0.019)	(0.126)	(0.114)	(0.096)
Constant	4.493***	−2.648	0.035	−3.427
	(0.188)	(2.020)	(2.593)	(2.357)
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Number of observations	16,845	7,531	7,531	7,531
Adjusted *R*-squared	0.592	0.496	0.549	0.451

pension payouts. However, if firms increase bonuses for reasons other than enhancing pensions (e.g., incentive provision), we would expect to find similar, if not larger, increases in equity awards.

We examine equity awards before plan freezes using the specification given in Eq. (1), replacing bonuses with equity. The regression results are presented in Table 4. In contrast to our findings of increases in annual bonuses, we find no increases in equity awards in the year before a plan freeze. This evidence lends further support to the view that annual bonuses are elevated before plan freezes precisely to increase executive pensions.

3.1.5. Methods of increasing pensionable earnings

If boards do seek to raise pensionable earnings for top executives ahead of plan freezes, they have several options: increasing salaries, boosting annual incentive pay, or awarding discretionary bonuses. Increasing salaries is more costly to firms due to the irreversibility of such increases. Increasing annual incentive pay provides stronger incentives for managerial effort, but it can induce earnings management ex post. In addition, boards perhaps are not able to modify the performance metrics beyond the first quarter of the pre-freeze year. Awarding discretionary bonuses does not provide incentives for managerial effort and does not induce earnings management. Discretionary bonuses are one-time extra payments and can be awarded by boards at the end of the year.

We examine salary payment using the specification given in Eq. (1), replacing bonus with salary and omitting salary from the list of control variables. We report the regression results in Column 1 of Table 5. We find no increase in salaries for top executives before plan freezes. We then examine annual incentive pay and discretionary

Table 6
Executive annual bonuses before retirement.

Panel A reports the results of the univariate analysis of annual bonuses, equity awards, and salaries before executive retirement. Pre depart is one if the executive is departing the following fiscal year and zero otherwise, as recorded in ExecuComp (ExecuComp items: LEFTCO, RELEFT, and LEFTOFC). *Age64*$^{+}$ is one if the executive is at or above 65 the following year and zero otherwise. Panel B reports the results of regressing executive bonuses or equity awards on a forthcoming retirement, as well as other firm and executive characteristics, as

$$Bonus_{ijt} = \alpha + \beta_1 \times Pre\ depart_{ijt} + \beta_2 \times Pre\ depart_{ijt} \times Age64^{+}{}_{ijt} + \beta_3 \times Age64^{+}{}_{ijt} + \gamma_1 \times Salary_{ijt} + \gamma_2 \times X_{i(j)t\ or\ t-1} + \eta_t + \mu_i + \varepsilon_{ijt}.$$

Dependent variable is *Bonus (ln)* in Column 1 and *Equity (ln)* in Column 2. All control variables are the same as in Table 2. We include year fixed effects and firm fixed effects. Robust standard errors in parentheses are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Panel A: Univariate analysis

Variable	*Pre depart* = 1			*Pre depart* = 0			Mean	*t*-test	Median	Median test
	N	Mean	Median	*N*	Mean	Median	Difference	*p*-value	Difference	*p*-value
Age64^{+} = 1										
Bonus (ln)	291	5.365	6.418	1210	4.811	5.864	0.554	.003	0.554	.001
Equity (ln)	291	5.257	6.428	1206	4.623	5.844	0.633	.005	0.584	.002
Salary (ln)	291	6.442	6.588	1210	6.271	6.395	0.171	.000	0.192	.000
Age64^{+} = 0										
Bonus (ln)	1397	5.041	5.899	28,053	5.166	5.632	-0.126	.033	0.266	.000
Equity (ln)	1383	5.680	6.582	27,612	5.331	6.171	0.350	.000	0.410	.000
Salary (ln)	1397	6.277	6.279	28,053	5.993	5.989	0.284	.000	0.290	.000

Panel B: Multivariate regressions

Variable	Dependent variable	
	Bonus (ln) (1)	*Equity (ln)* (2)
Pre depart	−.323***	−.289***
	(0.063)	(0.074)
Pre depart × *Age64*$^{+}$	.591***	0.134
	(0.145)	(0.218)
Age64^{+}	−.394***	−.657***
	(0.079)	(0.121)
Salary (ln)	.989***	1.628***
	(0.061)	(0.090)
Constant	−0.480	−5.495***
	(0.722)	(1.112)
Control variables (as in Table 2)	Yes	Yes
Year fixed effects	Yes	Yes
Firm fixed effects	Yes	Yes
Number of observations	30,951	30,492
Adjusted *R*-squared	0.504	0.396

bonuses starting in December 2006, when the two bonus components began to be reported separately. We find a 35.4% increase in annual bonuses before plan freezes (Column 2), mainly driven by the 45.9% increase in discretionary bonuses (Column 4), which is much larger than the 8.6% increase in annual incentive pay (Column 3). This evidence suggests that awarding discretionary bonuses, a cost-effective compensation adjustment, is the method of choice for boards seeking to increase executive pensionable earnings before plan freezes.

3.2. Bonus increases before executive retirement

In this subsection, we examine whether boards increase pensionable earnings before another benefit-capping event: executive retirement. We focus on retirements instead of all executive departures because executives have a greater opportunity to influence their compensation before planned retirements. We assume a retirement age of 65 (Weisbach, 1988), which is also the most frequent retirement age specified in DB plans. We obtain very similar results using 60 or 62 as the retirement age (Parrino, 1997; Kalyta, 2009). Anticipating retirement in the near future, an executive can lobby the board to increase pensionable earnings. We test this hypothesis on a subsample from 2000 to 2008, the period when departure dates are available in ExecuComp, and contrast bonuses with equity awards.[11]

3.2.1. Univariate analysis

We compare bonuses, equity awards, and salaries for top executives who leave the firm one year before their departure with the same metric for executives who remain. We also compare the compensation packages for top executives who exceed the retirement age with those who do

[11] ExecuComp stopped collecting executive departures dates (LEFTCO and RELEFT) after 2009 because this information was no longer required to be disclosed. LEFTOFC indicates the date on which a CEO left the corner office. We rule out top executives who stay at the firm after leaving the CEO position by checking whether the executives receive annual compensation after the date indicated by LEFTOFC.

not. In Panel A of Table 6, we show that retiring top executives receive an average increase of 0.554 in bonuses, 0.633 in equity awards, and 0.171 in salaries one year before their retirement. For top executives who depart the firm for non-retirement reasons, we find an average change of −0.126 in annual bonuses, 0.35 in equity awards, and 0.284 in salaries. The contrast in bonus awards between the retiring and non-retiring groups is most striking and statistically significant at the 1% level.

3.2.2. Multivariate regressions

We use the specification given in Eq. (1), replacing *Pre freeze* with *Pre depart* to indicate the year prior to an executive's departure and interacting *Pre depart* with the retirement indicator. In Panel B of Table 6, we show an average increase of 59.1% in annual bonuses for retiring executives, which corresponds to an average increase of $1.2 million for CEOs (Column 1).[12] We find no increase in equity awards before executive retirement (Column 2). These findings suggest that boards increase pensionable earnings only before executive retirement.

Drivers other than pensions affect bonus increases before executive retirement (Yermack, 2006), and we could have wrongly attributed the observed bonus increases to the presence of DB plans. To address such concerns, we compare increases in annual bonuses before executive retirement at firms with DB plans with bonus increases at ExecuComp firms that do not offer DB plans. We find that bonus increases before executive retirements are significantly greater at firms with DB plans than at firms without DB plans (untabulated).[13]

3.3. Discount rate manipulation at executive retirement

Having shown that boards award large bonuses to top executives before capping pension benefits, we examine whether firms modify other plan assumptions around these events. Comprix and Muller (2011) show that firms lowered plan discount rates by 18 bps prior to the Sarbanes-Oxley Act of 2002 to exaggerate the economic burden before DB plan freezes. We determine whether firms lower plan discount rates when top executives are eligible to retire and take lump-sum payouts.

3.3.1. Univariate analysis

Lowering plan discount rates exerts pressure on the funding status of a firm's qualified plans because it increases the present value of the overall pension liabilities. Thus, the incentive to lower plan discount rates mainly exists when lump-sum distribution is available, and it is stronger when an executive is eligible to retire and take a lump-sum payout.[14] An executive is eligible to retire if the retirement conditions specified in the DB plan are met and all pension benefits can be paid out without penalty. We classify a firm year as a *Retirement* year if at least one top executive is eligible to retire that year. Indicator *Lump sum* equals one if a lump-sum distribution of pension benefits is permitted at retirement and zero otherwise.

Panel A of Table 7 reports the differences between the discount rates for DB plans and the two benchmark rates: the *Moody's AA rate* and the *CCBR*. It includes firm years when Retirement = 1 and when Retirement = 0. We separate qualified plans and SERPs because some firms use younger ages to define retirement for SERPs than for qualified plans and apply different discount rates to different plans. When any top executive is eligible to retire, the deviations of plan discount rates from benchmark rates are, on average, 17 bps greater for qualified plans with the lump-sum option than qualified plans without the lump-sum option. For SERPs, the analogous deviations in retirement years are even greater, 24 bps. When no executives satisfy the retirement condition, the discount rates for qualified plans (SERPs) allowing lump-sum distribution are 4 bps (11 bps) lower than those that do not allow it.

3.3.2. Multivariate regressions

In this section, we examine in a multivariate regression setting whether the deviations of plan discount rates from two the benchmark rates are larger (more negative) in years in which top executives are eligible to retire and take lump-sum payouts. We test the hypothesis by running the regression

$$\begin{aligned} Discount\ rate_{it} - Benchmark\ rate_t = {} & \alpha + \beta_1 \\ & \times Lump\ sum_{it} + \beta_2 \times Retirement_{it} \\ & + \beta_3 \times Lump\ sum_{it} \times Retirement_{it} + \eta_t + \varepsilon_{it}. \end{aligned} \tag{2}$$

We include year fixed effects and cluster standard errors at the firm level. We present the regression results in Panel B of Table 7. In all specifications, the coefficient estimate of *Lump sum* × *Retirement* is negative and statistically significant at the 5% level or lower. When lump-sum distribution is permitted, firms lower the discount rates for their DB plans by 13 bps on average when any top executive is eligible to retire. Conditional on retirement, the discount rates are 17 bps lower for qualified plans (−0.037 −0.133 for Column 1 and −0.038 −0.129 for Column 2) and 24 bps lower for SERPs (Columns 3 and 4) when the lump-sum distribution option is available.

[12] Suppose a benefit factor of 0.02, a discount rate of 5.5%, a CEO retiring at 65 with 22 years of service, a three-year average salary of $834,828 (sample median), three-year average bonuses before any increase of $670,446 (sample median), and a PV factor of 11.62 (for males). A 59.1% increase in bonuses (corresponding to $446,673) before retirement increases the PV of pensions by $760,981, thus increasing total compensation by $1.2 million.

[13] We further examine whether executives manipulate earnings before planned retirement (Dechow and Sloan, 1991; Murphy and Zimmerman, 1993). We use six proxies for accounting-based earnings management (discretionary accruals derived from the Jones model and its variations) and three proxies for real earnings management (annual growth rate of research and development, advertising, and capital expenditures). We find no earnings management over the period of one to three years before executive retirement. These results are consistent with findings in Murphy and Zimmerman and are available upon request.

[14] For example, when Robert Keegan retired from Goodyear Tire & Rubber Company in 2010 and received all of his pension benefits in a lump sum, the discount rate for Goodyear's SERP decreased by 75 bps from the 2009 level. In contrast, the average decrease in the SERP discount rates from 2009 to 2010 was 47 bps in our sample and the average decreases in the Moody's AA rate and the CCBR over the same period were only 25 bps and 34 bps, respectively.

Table 7
Plan discount rate at executive retirement.

Panel A reports the results of the univariate analysis of the plan discount rate in excess of benchmark rates: Moody's AA rate and CCBR. Retirement is one if any top executive of the firm meets the retirement condition under qualified plans and supplemental executive retirement plans (SERPs), respectively. *Lump sum* is one if lump-sum distribution of pension benefits is permitted and zero otherwise. *Discount rate* (r) is the rate used to calculate the present value of pension benefits. Panel B reports the results of regressing the discount rate in excess of the benchmark rate on *Lump sum, Retirement*, and their interaction term as

$$Discount\ rate_{it} - Benchmark\ rate_t = \alpha + \beta_1 \times\ Lump\ sum_{it} + \beta_2 \times Lump\ sum_{it} \times Retirement_{it}\ +\ \beta_3 \times Retirement_{it} + \eta_t +\ \varepsilon_{it}.$$

Columns 1 and 2 are for qualified plans; Columns 3 and 4, SERPs. We include year fixed effects in all regressions. Robust standard errors in parentheses are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Panel A: Univariate analysis

	Lump sum = 1			*Lump sum* = 0			Mean	*t*-test	Median	Median test
Variable	*N*	Mean	Median	*N*	Mean	Median	Difference	*p*-value	Difference	*p*-value
Retirement = 1										
Qualified plans										
r − *Moody's AA rate*	1,087	0.220	0.300	586	0.387	0.360	−0.167	.000	−0.060	.000
r − *CCBR*	1,087	−0.176	−0.070	586	−0.008	0.015	−0.168	.000	−0.085	.000
SERPs										
r − *Moody's AA rate*	1,222	0.126	0.220	628	0.362	0.340	−0.237	.000	−0.120	.000
r − *CCBR*	1,222	−0.276	−0.130	628	−0.034	0.000	−0.242	.000	−0.130	.000
Retirement = 0										
Qualified plans										
r − *Moody's AA rate*	2,190	0.310	0.320	1,276	0.349	0.360	−0.039	.040	−0.040	.000
r − *CCBR*	2,190	−0.120	−0.080	1,276	−0.084	−0.020	−0.036	.049	−0.060	.000
SERPs										
r − *Moody's AA rate*	2,019	0.203	0.290	1,119	0.314	0.340	−0.111	.000	−0.050	.000
r − *CCBR*	2,019	−0.228	−0.130	1,119	−0.118	−0.045	−0.110	.000	−0.085	.000

Panel B: Multivariate regressions

	Dependent variable			
	Qualified plans		SERPs	
Variable	*r* − *Moody's AA rate* (1)	*r* − *CCBR* (2)	*r* − *Moody's AA rate* (3)	*r* − *CCBR* (4)
Lump sum	−0.037	−0.038	−.110***	−.111***
	(0.031)	(0.031)	(0.038)	(0.038)
Lump sum × *Retirement*	−.133***	−.129***	−.130**	−.128**
	(0.045)	(0.045)	(0.053)	(0.053)
Retirement	.061**	.057*	.067**	.066**
	(0.029)	(0.029)	(0.029)	(0.029)
Constant	.341***	−.078***	.308***	−.112***
	(0.023)	(0.023)	(0.022)	(0.022)
Year fixed effects	Yes	Yes	Yes	Yes
Number of observations	5,139	5,139	4,988	4,988
Adjusted *R*-squared	0.110	0.064	0.091	0.051

Our results are robust to various alternative specifications.[15] For example, discount rate reduction is not concentrated in any particular year. Although the short time series of our discount rate data does not permit meaningful regressions with firm fixed effects, adding industry fixed effects does not change our conclusions. Moreover, if we use the benchmark rate as an independent variable in the plan discount rate regression, allowing its coefficient to differ from one, we find a similar extent of plan discount rate reduction when top executives are eligible to retire with a lump-sum distribution. In the absence of year fixed effects, the coefficient estimates of the high-quality bond rates are very close to one (untabulated).

The observed decreases in plan discount rates could be consistent with two explanations. First, boards lower plan discount rates to award executives with more generous retirement packages. Second, executives who meet retirement conditions choose to retire in years in which plan discount rates are low. However, if top executives time

[15] The Pension Protection Act (PPA 2006, 120 STAT. 920–921) mandated the use of a high-quality bond rate as the reference discount rate in calculating the minimum lump-sum distribution for qualified plans, replacing the previous reference to the 30-year Treasury bond yield. The new rule applies to "plan years beginning after December 31, 2007," with an annual transition rate of 20% to the bond rate over a five-year phase-in period. In alternative analyses, we construct the weighted average of the Treasury bond yield and two corporate bond rates (*Moody's AA rate*, the Moody's AA corporate bond index and *CCBR*, the IRS' Composite Corporate Bond Rate) based on the transition schedule governed by PPA 2006. For example, for a firm with fiscal (plan) years that end in December, the weights used for the Treasury bond yield and bond rate are [100%, 0%] in 2006 and 2007, [80%, 20%] in 2008, [60%, 40%] in 2009, [40%, 60%] in 2010, [20%, 80%] in 2011, and [0%, 100%] in 2012 and 2013. Our results are qualitatively the same if we use the two constructed benchmark rates (untabulated).

Table 8
Effect of corporate governance.
This table reports the results of testing how corporate governance affects bonus increases before plan freezes and executive retirement and discount rate decreases at executive retirement. The governance measure, *Strong governance*, is one if the governance index is greater than four (in the top quintile) and zero otherwise. In Panel A, we regress executive bonuses on a forthcoming plan freeze, the strong governance indicator, and their interaction term, as well as other firm and executive characteristics. The sample includes firms that implemented pension freezes during our sample period. Panel B reports the results of subsample regressions of executive bonuses on a forthcoming retirement and other firm and executive characteristics. We split the sample into subsamples based on *Strong governance*. Year and firm fixed effects are included in both Panels A and B. Panel C and Panel D report the subsample regressions of the discount rates for qualified plans and supplemental executive retirement plans (SERPs) in excess of the benchmark rates, *Moody's AA rate* and *CCBR*, respectively, on *Lump sum, Retirement*, and their interaction term. We split the sample based on *Strong governance*. Year fixed effects are included. All control variables are included as in Table 2 and defined in Table A1. Robust standard errors in parentheses are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Panel A: Annual bonuses before plan freezes

Variable	Dependent variable *Bonus (ln)*
Pre freeze	.459***
	(0.106)
Pre freeze × *Strong governance*	−.649**
	(0.283)
Strong governance	−0.070
	(0.118)
Salary (ln)	1.097***
	(0.130)
Constant	0.642
	(1.493)
Control variables (as in Table 2)	Yes
Year fixed effects	Yes
Firm fixed effects	Yes
Number of observations	11,382
Adjusted *R*-squared	0.447

Panel B: Annual bonuses before retirement

Variable	Dependent variable: *Bonus(ln)*	
	Strong governance = 1 (1)	*Strong governance* = 0 (2)
Pre depart	−0.089	−.252***
	(0.117)	(0.083)
Pre depart × *Age64*$^{+}$	0.389	.525***
	(0.436)	(0.186)
Age64^{+}	−.661***	−.391***
	(0.197)	(0.094)
Salary (ln)	1.155***	1.063***
	(0.120)	(0.078)
Constant	1.840	0.951
	(1.619)	(1.269)
Control variables (as in Table 2)	Yes	Yes
Year fixed effects	Yes	Yes
Firm fixed effects	Yes	Yes
Number of observations	3,896	17,862
Adjusted *R*-squared	0.572	0.504

(continued on next page.)

their retirement, they should pay attention to plan discount rates themselves (= deviation of plan discount rates from benchmark rates + benchmark rates), not just the deviation of plan discount rates from the benchmark rates. Moreover, retirement in our regression analysis is defined ex ante; that is, when at least one top executive meets the retirement condition specified in the DB plan, regardless of whether any executive leaves the firm that year. Thus, our findings are more in line with the first explanation than the second one.

4. Managerial rent seeking versus optimal contracting

In this section, we examine whether increasing executive pension payouts around key pension-related events is more consistent with managerial rent seeking or optimal contracting. According to optimal contracting theories, a highly talented manager affects a firm's productivity and profitability to a greater extent at the margin than a rank-and-file employee. It is thus important for boards to compensate top executives to induce managerial effort and to improve retention (Rosen 1981; Edmans et al., 2009; Baranchuk et al., 2011). The managerial rent-seeking view argues that weak governance structures lead boards to award CEOs greater excess pay to the detriment of shareholders (Core et al., 1999; Bertrand and Mullainathan, 2001; Bebchuk and Fried, 2004; Faleye et al., 2011). We compare the extent of bonus increases and discount rate manipulation across firms with strong and weak

Table 8
(continued)

Panel C: Discount rates for qualified plans at retirement

	Dependent variable			
	Strong governance = 1		*Strong governance* = 0	
Variable	*r* – *Moody's AA rate* (1)	*r* – *CCBR* (2)	*r* – *Moody's AA rate* (3)	*r* – *CCBR* (4)
Lump sum	−0.034	−0.037	−0.049	−0.048
	(0.052)	(0.052)	(0.042)	(0.042)
Lump sum × *Retirement*	−0.030	−0.031	−.183***	−.179***
	(0.112)	(0.112)	(0.056)	(0.056)
Retirement	0.097	0.099	.076**	.072**
	(0.090)	(0.091)	(0.036)	(0.036)
Constant	0.094	−0.074	.201***	0.032
	(0.067)	(0.067)	(0.040)	(0.040)
Year fixed effects	Yes	Yes	Yes	Yes
Number of observations	696	696	2,991	2,991
Adjusted *R*-squared	0.126	0.024	0.111	0.090

Panel D: Discount rates for SERPs at retirement

	Dependent variable			
	Strong governance = 1		*Strong governance* = 0	
Variable	*r* – *Moody's AA rate* (1)	*r* – *CCBR* (2)	*r* – *Moody's AA rate* (3)	*r* – *CCBR* (4)
Lump sum	−0.034	−0.034	−.162***	−.162***
	(0.076)	(0.077)	(0.047)	(0.047)
Lump sum × *Retirement*	−0.021	-0.033	−.141**	−.137**
	(0.115)	(0.113)	(0.061)	(0.061)
Retirement	0.035	0.044	.066*	.063*
	(0.063)	(0.059)	(0.037)	(0.037)
Constant	0.106	−0.065	.211***	0.041
	(0.068)	(0.068)	(0.040)	(0.040)
Year fixed effects	Yes	Yes	Yes	Yes
Number of observations	659	659	2,973	2,973
Adjusted *R*-squared	0.106	0.013	0.099	0.075

corporate governance. We also test the predictions of optimal contracting on incentive provision and retention before plan freezes. Finally, we examine whether firms decrease plan discount rates more substantially when retiring executives would benefit more from such decreases.

4.1. Effect of corporate governance

We use board characteristics and ownership structure to construct a corporate governance index. Board size, the fraction of independent directors, busy directors (directors serving on two or more other boards), and co-opted directors (directors appointed to the board after the CEO took the corner office), as well as whether the CEO serves as the chairman of the board indicate the relative bargaining power between top executives and boards (Yermack, 1996; Core et al., 1999; Adams et al., 2005; Fich and Shivdasani, 2006; Coles et al., 2008, 2014). In addition, large ownership blocks of institutional investors and independent directors motivate shareholders and facilitate boards to monitor top executives effectively.

We construct an equal-weighted governance index using seven indicators defined relative to the sample median: board size (−), the fraction of independent directors (+), the fraction of busy directors (−), the fraction of co-opted directors (−), CEO and chairman duality (−), outside directors' ownership (+), and institutional ownership (+). For example, a board with fewer directors tends to monitor more effectively. Thus, board size contributes negatively to the governance strength index (Yermack, 1996). We use "(−)" to indicate this negative correlation. A firm is defined as having strong governance if its governance index is greater than four (in the top quintile of our sample).

We find no significant increase in executive annual bonuses before plan freezes at firms with strong governance (0.459 – 0.649 = – 0.19; *p*-value = .469), but firms with weak governance show an average increase of 45.9% (statistically significant at the 1% level; see Panel A of Table 8).[16] Similarly, we find no significant increase in annual bonuses before executive retirement at firms with strong governance (Column 1 of Panel B), but firms with weak governance have an average increase of 52.5% (Column 2 of Panel B). Moreover, firms with strong governance

[16] We also use excess CEO pay (Core, Holthausen, and Larcker, 1999) one year before the *Pre freeze* year as the proxy for managerial entrenchment at the time of freeze and bonus decisions. CEOs at firms with high excess CEO cash pay or high excess CEO total pay (in the top quintile of our sample) receive significantly larger bonuses one year before plan freeze, consistent with the managerial rent-seeking view. Other top executives at these firms also receive larger bonuses before plan freezes, but the difference is not statistically significant at a conventional level.

Table 9
Executive annual bonuses before plan freezes: improving managerial incentive.

This table reports the results of regressing executive bonuses on an impending pension plan freeze, Pre freeze, and its interactions with variables measuring managerial efforts needed for implementing plan freeze decisions, as well as other firm and executive characteristics. In Column 1, we estimate the ordinary least squares regression

$$Bonus_{ijt} = \alpha + \beta_1 \times Pre\ freeze_{it} + \beta_2 \times Pre\ freeze_{it} \times Underfunded_{it} + \beta_3 \times Underfunded_{it} + \gamma_1 \times Salary_{ijt} + \gamma_2 \times X_{i(j)t\ or\ t-1} + \eta_t + \mu_i + \varepsilon_{ijt}.$$

In Columns 2 and 3, we use *Relative pension size* and *Unionized* to replace *Underfunded*. *Pre freeze* is one if the firm is freezing its pension plans the following fiscal year and zero otherwise. *Underfunded* is one if the firm's overall pension assets are lower than its pension obligations. *Relative pension size* is the ratio of the projected pension benefit obligation to the firm's total assets. *Unionized* is one if all defined benefit plans of the firm are unionized and zero otherwise. Because there are cases of zero bonus and salary payouts, we add one to the raw data (in thousands of dollars) and take the natural logarithmic transformation of (1 + *Bonus*) and (1 + *Salary*). All control variables are included as in Table 2 and defined in Table A1. All regressions are restricted to the sample of firms that implemented pension freezes during our sample period, and year fixed effects and firm fixed effects are included. Robust standard errors in parentheses are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Variable	Dependent variable: *Bonus (ln)*		
	Underfunded (1)	*Relative pension size* (2)	*Unionized* (3)
Pre freeze	.433*	.292**	.256***
	(0.228)	(0.117)	(0.094)
Pre freeze × *Underfunded*	−0.168		
	(0.252)		
Underfunded	−0.157		
	(0.119)		
Pre freeze × *Relative pension size*		0.007	
		(0.379)	
Relative pension size		−0.042	
		(0.652)	
Pre freeze × *Unionized*			0.292
			(0.331)
Unionized			−0.056
			(0.188)
Salary (ln)	1.088***	1.087***	1.084***
	(0.108)	(0.107)	(0.103)
Constant	0.105	0.032	−0.722
	(1.041)	(1.186)	(1.118)
Control variables (as in Table 2)	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Number of observations	16,737	16,845	15,815
Adjusted *R*-squared	0.441	0.440	0.446

do not lower plan discount rates when their top executives are eligible to retire with lump-sum payouts (Columns 1 and 2 of Panels C and D), and firms with weak governance lower discount rates by 14 to 18 bps (Columns 3 and 4 of Panels C and D). These findings provide more support for the managerial rent-seeking view.

4.2. Additional cross-sectional tests

Under optimal contracting, boards optimally design executive compensation plans to provide incentives for managerial effort and to retain top executives given the intense competition for managerial talent. An explicit employment contract or implicit agreement on the compensation packages over an executive's career can also force the board to make the executive whole after a plan freeze. Competition from the managerial labor market reinforces such a mechanism. Thus, our empirical findings of boards making executives whole while deeply cutting the benefits of regular workers could reflect the necessity of motivating and retaining top executives instead of managerial rent seeking.[17]

4.2.1. Incentive provision for managerial effort

If bonus increases before plan freezes aim to motivate managerial effort, we expect to find greater bonus increases when the freeze decision calls for greater managerial effort, that is, when a DB plan is more difficult to freeze (with good funding status or for unionized workers) or when freezing the plan is more important for the firm's survival and success (large pension plans). We add indicators *Underfunded, Unionized* (equal to one if all of the firm's DB plans are for unionized workers), and *Relative pension size*, and we interact each with the *Pre freeze* indicator. [18] We expect to find a negative sign for *Underfunded* × *Pre freeze* and a positive sign for the other two interaction terms. As reported in Table 9, the coefficient estimates of all three interaction terms are statistically insignificant. These results do not support the theory that

[17] Rauh, Stefanescu, and Zeldes (2016) show that freezing the DB plan generates considerable savings for the firm (at least 3% of total payroll per year) even after accounting for additional contributions to supplementary defined contribution plans.

[18] Our results are similar if we use alternative unionization measures to *Unionized*: (1) an indicator of one if at least one DB plan is unionized, (2) the fraction of DB plans that are unionized, and (3) the fraction of accumulated benefit obligation under unionized plans.

Table 10
Executive annual bonuses before plan freezes: improving retention.

This table reports the results of examining the prediction of optimal contracting on improving retention. In Panel A, we report the summary statistics of four market competitiveness measures: *Outside CEOs, Co-movement, HHI*, and *Fluidity. Outside CEOs* is the fraction of outside new chief executive officers across the Fama and French classification of 48 industry groups, collected from Table III of Cremers and Grinstein (2014). *Co-movement* measures the correlation between monthly stock returns between 1999 and 2012 of all Center for Research in Security Prices firms within two-digit standard industrial classification (SIC) industries (Parrino, 1997). *HHI* measures industry concentration and is computed as the sum of squared market shares based on sales of Compustat firms within two-digit SIC industries (Hoberg and Phillips, 2010; Giroud and Mueller, 2010). *Fluidity* measures the product market threat and is downloaded from Hoberg and Phillip's website (http://hobergphillips.usc.edu/industryconcen.htm, Hoberg et al., 2014). Panel B reports the results of regressing executive bonuses on an impending plan freeze and its interaction terms with variables measuring the competitiveness of managerial labor market, as well as other firm and executive characteristics. In Column 1, we estimate the ordinary least squares regression

$$Bonus_{ijt} = \alpha + \beta_1 \times Pre\ freeze_{it} + \beta_2 \times Pre\ freeze_{it} \times Outside\ CEOs_{it} + \beta_3 \times Outside\ CEOs_{it} + \gamma_1 \times Salary_{ijt} + \gamma_2 \times X_{i(j)t\ or\ t-1} + \eta_t + \mu_i + \varepsilon_{ijt}.$$

In Columns 2 through 4, we use *Co-movement, HHI*, and *Fluidity* to replace *Outside CEOs*, respectively. *Pre freeze* is one if the firm is freezing its pension plans the following fiscal year and zero otherwise. Because there are cases of zero bonus and salary payouts, we add one to the raw data (in thousands of dollars) and take the natural logarithmic transformation of (1 + *Bonus*) and (1 + *Salary*). All control variables are included as in Table 2 and defined in Table A1. All regressions are restricted to the sample of firms that implemented pension freezes during our sample period. Columns 1 and 2 include year fixed effects, and Columns 3 and 4 include year fixed effects and firm fixed effects. We must omit firm fixed effects from Columns 1 and 2 or else *Outside CEOs* and *Co-movement* would drop out from the regressions because these two variables do not vary over time. Robust standard errors in parentheses are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Panel A: Summary statistics on market competitiveness measures

Variable	*N*	1st percentile	25th percentile	Median	75th percentile	99th percentile	Mean	Standard deviation
Outside CEOs	16,683	0.000	0.200	0.277	0.350	0.590	0.287	0.119
Co-movement	14,084	0.369	0.641	0.813	0.902	1.028	0.734	0.200
HHI	16,845	0.008	0.045	0.067	0.119	0.395	0.096	0.080
Fluidity	16,279	1.385	3.605	5.253	7.768	20.365	6.221	3.841

Panel B: Multivariate regressions

	Dependent variable: *Bonus (ln)*			
Variable	*Outside CEO* (1)	*Co-movement* (2)	*HHI* (3)	*Fluidity* (4)
Pre freeze	0.148	.856***	.310**	.560***
	(0.215)	(0.277)	(0.122)	(0.216)
Pre freeze × *Outside CEOs*	0.488			
	(0.670)			
Outside CEOs	−0.040			
	(0.449)			
Pre freeze × *Co-movement*		−.772**		
		(0.387)		
Co-movement		0.340		
		(0.253)		
Pre freeze × *HHI*			−0.195	
			(1.016)	
HHI			−4.616***	
			(1.683)	
Pre freeze × *Fluidity*				−0.041
				(0.031)
Fluidity				−.045*
				(0.026)
Salary (ln)	1.189***	1.136***	1.089***	1.100***
	(0.107)	(0.121)	(0.107)	(0.103)
Constant	−4.445***	−4.477***	0.456	0.332
	(0.536)	(0.590)	(1.047)	(1.060)
Control variables (as in Table 2)	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	No	No	Yes	Yes
Number of observations	16,683	14,084	16,845	16,279
Adjusted *R*-squared	0.342	0.337	0.442	0.448

bonus increases before plan freezes are intended to provide incentives for managerial effort.

4.2.2. Incentive provision for retention

If making executives whole after plan freezes aims to improve retention, we expect to find greater bonus increases when the competition for managerial talent is more intense and managers have better outside options. Thus, bonus increases before plan freezes should be greater in industries with a larger fraction of CEOs hired from outside (+), when stock prices of firms in the industry tend to co-move (+), when the Herfindahl-Hirschman Index (HHI) for the industry is smaller (−), and when the product market is more fluid (+).

Table 11
Plan discount rate and executive retirement: effect of pension size.
This table reports the results of regressing the discount rate in excess of the benchmark rate on Lump sum, *Group* 1, *Group*2, and the interactions of *Lump sum* with *Group 1* and *Group 2*. We estimate the ordinary least squares regression:

$$Discount\ rate_{it} - Benchmark\ rate_t = \alpha + \beta_1 \times Lump\ sum_{it} + \beta_2 \times Lump\ sum_{it} \times Group\ 1_{it}$$
$$+ \beta_3 \times Lump\ sum_{it} \times Group\ 2_{it} + \beta_4 \times Group\ 1_{it} + \beta_5 \times Group\ 2_{it} + \eta_t + \varepsilon_{it}.$$

Among firms with retiring executives [who meet the retirement condition under qualified plans and supplemental executive retirement plans (SERPs), respectively], we assign them into two groups based on the size of the retiring executives' pension benefits in a descending order. *Group 1* consists of firms in which the retiring executives' pension size is in the top quintile, and *Group 2* consists of other firms with executives retiring that year. The omitted group consists of firms without executives retiring that year. The sample period starts in December 2006, because 2006 is the first year when data on the present value of pension benefits are available. *Lump sum* is one if lump-sum distribution of pension benefits is permitted and zero otherwise. *Discount rate* (r) is the rate used to calculate the present value of pension benefits under qualified plans and SERPs. We use *Moody's AA rate* and *CCBR* as the benchmark rates. Columns 1 and 2 report regressions for qualified plans, and Columns 3 and 4 report regressions for SERPs. We include year fixed effects in all regressions. Robust standard errors in parentheses are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable			
	Qualified plans		SERPs	
Variable	*r* − *Moody's AA rate* (1)	*r* − *CCBR* (2)	*r* − *Moody's AA rate* (3)	*r* − *CCBR* (4)
Lump sum	−0.036	−0.037	−.115***	−.116***
	(0.032)	(0.032)	(0.040)	(0.040)
(a) *Lump sum* × *Group 1*	−.333***	−.330***	−.348***	−.330***
	(0.121)	(0.122)	(0.124)	(0.125)
(b) *Lump sum* × *Group 2*	−.145***	−.137**	−.125**	−.122*
	(0.056)	(0.055)	(0.063)	(0.063)
Group 1	.210**	.208**	.259***	.241**
	(0.085)	(0.086)	(0.093)	(0.095)
Group 2	.070**	.058*	.058*	0.051
	(0.036)	(0.035)	(0.034)	(0.034)
Constant	.266***	−.092***	.249***	−.110***
	(0.026)	(0.026)	(0.027)	(0.027)
Year fixed effects	Yes	Yes	Yes	Yes
Number of observations	4,331	4,331	4,183	4,183
Adjusted *R*-squared	0.107	0.068	0.093	0.050
p-value of test on H_0: (a) = (b)	0.135	0.125	0.066	0.090

Cross-sectional data on *Outside CEOs* across the Fama and French classification of 48 industry groups are derived from Table III of Cremers and Grinstein (2014). Cross-sectional data on stock return *Co-movement* are calculated based on monthly stock returns of all CRSP firms within two-digit SIC industries between 1999 and 2012. Following Parrino (1997), we use an equal-weighted return index. A value-weighted return index yields similar results. Panel data on *HHI* at the industry year level are computed as the sum of squared market shares based on sales of Compustat firms within two-digit SIC industries (Hoberg and Phillips, 2010; Giroud and Mueller, 2010). Panel data on *Fluidity* at the firm year level are downloaded from Hoberg and Phillip's website (http://hobergphillips.usc.edu/industryconcen.htm). *Fluidity* captures the changes in rival products relative to the firm's products based on product descriptions in 10-K filings (Hoberg et al., 2014).

Panel A of Table 10 describes the four measures of market competitiveness. Adding each of these measures and their interactions with *Pre freeze* to our baseline regressions, we show in Panel B that the coefficient estimates of *Pre freeze* × *Outside CEOs* and *Pre freeze* × *HHI* have the expected sign but no statistical significance and that the signs on the coefficient estimates of *Pre freeze* × *Co-movement* and *Pre freeze* × *Fluidity* do not even match the predictions. Overall, we find no support for the retention prediction of optimal contracting theories.

4.2.3. Plan discount rate manipulation at executive retirement

We next examine whether the incentive to lower discount rates is stronger when retiring top executives would benefit more. Retirement benefit is measured by the present value of total pension benefits (ExecuComp variable PENSION_VALUE) in the year prior to retirement, scaled by base salary. If multiple top executives retire in a single year, we aggregate the values over all retiring executives. This measure takes into account the number of retiring executives and the sizes of their stakes. Our results are similar if we use the maximum pension value among all retiring executives (untabulated). We sort firms into three groups. The base group contains firms without executives retiring that year. These firms have the weakest incentive to lower plan discount rates. We further divide firms with retiring executives by the size of their retirement benefits: *Group 1* includes the top quintile of this subset, and *Group 2* is composed of the remaining four quintiles.

The results presented in Table 11 show that plan discount rates are lowered, on average, by 33 bps to 35 bps (relative to the benchmark rates) for firm years with the strongest incentive to lower them (those in *Group 1*). Plan discount rates are lowered by 12 bps to 15 bps for firm years with some incentive to lower them (those in *Group 2*). Both are statistically different from the base group (firms with no retiring executives that year). The differ-

ences between *Group 1* and *Group 2* are statistically significant at the 10% level for SERPs.

Economically, using the median present value of DB plans for CEOs with large pensions in the year prior to their retirement (about $16.9 million) and a retirement age of 65, we estimate that lowering the discount rate from 5.50% to 5.15% increases the value of the lump-sum payouts by $464,330 for male CEOs based on the mortality table. Lowered plan discount rates, compounded by increased bonuses before retirement, could substantially increase the pension payouts to retiring top executives. Overall, our results in Section 4 suggest that, at firms with weak governance, boards increase pension payouts for the benefit of top executives.

5. Conclusion

Executive pensions are an important component of executive compensation packages. Empirical research in this area has been constrained by the complex nature of these pension arrangements and, until recently, by the lack of publicly available data. Our paper shows that, with weak corporate governance, executives are more likely to receive one-time bonuses or benefit from reduced plan discount rates. Our results are more consistent with the managerial rent-seeking view of executive compensation. However, the fact that boards adjust executive compensation in a cost-effective manner reflects their effort at optimization, subject to the constraint that an executive is compensated to offset the cost of the pension freeze.

Appendix

Table A1
Variable definitions.

Variable	Definition
Age64+	Indicator that equals one if the executive is 64 or older and zero otherwise.
Board size	Number of directors serving on the board [Institutional Shareholder Services (ISS) data].
Bonus	Ln (1 + bonus prior to December 2006, ExecuComp item: BONUS; and 1 + bonus + non-equity incentive payout starting in December 2006, ExecuComp items: BONUS + NONEQ_INCENT). The units are thousands of dollars.
Cash flow volatility	Value of the two-digit standard industrial classification (SIC) industry median of cash flow volatility, which is the standard deviation of cash flow (scaled by total firm assets) in the past ten years. Cash flow is the sum of income before extraordinary items (Compustat item: IB) and depreciation and amortization (Compustat item: DP).
CCBR	Internal Revenue Service's Composite Corporate Bond Rate.
CEO	Indicator that equals one if the executive is chief executive officer (CEO).
CEO/Chairman duality	Indicator that equals one if CEO is the chairman of the board (ExecuComp items: CEOANN, TITLEANN).
Co-movement	Measure for the correlation between monthly stock returns between 1999 and 2012 of all Center for Research in Security Prices (CRSP) firms within two-digit SIC industries (Parrino, 1997).
Discretionary bonus (ln)	Ln (1 + bonus starting in December 2006, ExecuComp item: BONUS). The units are thousands of dollars.
Discount rate (r)	Rate used to calculate the present value of pension benefits under qualified plans and supplemental executive retirement plans (SERPs), respectively, as disclosed in firms' proxy statements or 10-K filings.
Equity	Ln (1 + dollar value of restricted stock and option awards calculated using the Black-Scholes model before December 2006, ExecuComp items: RSTKGRNT + OPTION_AWARDS_BLK_VALUE; and 1 + grant-date fair values of stock and option awards starting in December 2006, ExecuComp items: STOCK_AWARDS_FV + OPTION_AWARDS_FV). We add one because equity values are zero in many cases. The units are thousands of dollars.
HHI	Measure of industry concentration, which is computed as the sum of squared market shares based on sales (Compustat item: SALE) of Compustat firms within two-digit SIC industries (Hoberg and Phillips, 2010; Giroud and Mueller, 2010).
Fluidity	Measure of product market threat, which captures changes in rival firms' products relative to the firm's products based on 10-K text analysis. Data are downloaded from Hoberg and Phillip's website (http://hobergphillips.usc.edu/industryconcen.htm), which is at the firm year level and is updated until 2013 (Hoberg et al., 2014).
Funding%	Ratio of the company's overall pension assets to pension obligations (Compustat items: PPLAO/PBPRO).
% Busy directors	Fraction of directors who serve on two or more other boards (ISS data).
% Co-opted directors	Fraction of directors who were appointed after a CEO assumed office (ISS data).
% Independent directors	Fraction of outside directors (ISS data).
Income increase	Indicator that equals one if the firm's net income increases from last year and zero otherwise.
Institutional ownership	Fraction of shares held by institutional investors (Thomson Reuters Institutional Holdings data).
Leverage	Ratio of the sum of long- and short-term debt (Compustat items: DLTT and DLC) to total assets (Compustat item: AT).
Lump sum	Indicator that equals one if lump-sum distribution of pension benefits is permitted and zero otherwise.
M/B	Ratio of the market value of common equity (Compustat items: PRCC_F × CSHO) to the book value of common equity (Compustat item: CEQ).
Moody's AA rate	Moody's AA corporate bond index, extracted from Bloomberg (Bloomberg item: MOODCAA).
Negative income	Indicator that equals one if the firm's net income is negative and zero otherwise.
Non-equity incentive (ln)	Ln (1 + non-equity incentive payout starting in December 2006, ExecuComp item: NONEQ_INCENT). The units are thousands of dollars.
Outside directors' ownership	Fraction of shares held by outside directors (ISS data).
Outside CEOs	Fraction of outsider new CEOs across the Fama and French classification of 48 industry groups. Data are collected from Table III of Cremers and Grinstein (2014).

(*continued on next page*)

Table A1 (*continued*)

Variable	Definition
Pension value	Present value of each executive's pension benefits (ExecuComp item: PENSION_VALUE) under all plans scaled by salary (ExecuComp item: SALARY).
Pre depart	Indicator that equals one if the executive departs in the next fiscal year and zero otherwise.
Pre freeze	Indicator that equals one if the firm freezes its defined benefit (DB) pension plan in the next fiscal year and zero otherwise.
Relative pension size	Ratio of the projected pension benefit obligation (Compustat Item: PBPRO) to total assets (Compustat item: AT).
Retirement	Indicator that equals one if any top executive meets the retirement condition in a fiscal year under a DB plan and zero otherwise.
Return	Stock return (including distribution and reinvestment from CRSP) in the fiscal year (CRSP item: RET).
Return volatility	Volatility of monthly stock returns of the 12 months in the fiscal year.
ROA	Ratio of earnings before income and taxes (EBIT) to total assets (Compustat items: EBIT/AT).
Salary	Ln (1 + salary) (ExecuComp item: SALARY). The units are thousands of dollars.
Sales	Ln (sales) (Compustat item: SALE).
Strong governance	Indicator that equals one if the governance index is greater than four. The governance index is created as an equal-weighted index of seven indicators of governance measures (*Board size, CEO and chairman duality, % Busy directors, % Co-opted directors, % Independent directors, Institutional ownership*, and *Outside directors' ownership*).
Total assets	Ln (total assets) (Compustat item: AT).
Underfunded	Indicator that equals one if the firm's overall pension assets (Compustat Item: PPLAO) are lower than its pension obligations (Compustat item: PBPRO).
Unionized	Indicator that equals one if all DB plans of the firm are unionized and zero otherwise.

References

Adams, R.B., Almeida, H., Ferreira, D., 2005. Powerful CEOs and their impact on corporate performance. Review of Financial Studies 18, 1403–1432.

Baranchuk, N., MacDonald, G., Yang, J., 2011. The economics of super managers. Review of Financial Studies 24, 3321–3368.

Beaudoin, C., Chandar, N., Werner, E., 2010. Are potential effects of SFAS 158 associated with firms' decisions to freeze their defined benefit pension plans? Review of Accounting and Finance 9, 424–451.

Bebchuk, L., Fried, J., 2004. Pay without Performance—The Unfulfilled Promise of Executive Compensation. Harvard University Press, Cambridge, MA.

Begley, J., Chamberlain, S., Yang, S., Zhang, J.L., 2015. CEO incentives and the health of defined benefit pension plans. Review of Accounting Studies 20, 1013–1058.

Bergstresser, D., Desai, M., Rauh, J., 2006. Earnings manipulation, pension assumptions, and managerial investment decisions. Quarterly Journal of Economics 121, 157–195.

Bertrand, M., Mullainathan, S., 2001. Are CEOs rewarded for luck? The ones without principals are. Quarterly Journal of Economics 116, 901–932.

Bizjak, J., Lemmon, M., Ngyuen, T., 2011. Are all CEOs above average? An empirical analysis of compensation peer groups and pay design. Journal of Financial Economics 100, 538–555.

Cadman, B., Vincent, L., 2015. The role of defined benefit pension plans in executive compensation. European Accounting Review 24, 779–800.

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

Coles, J., Daniel, N., Naveen, L., 2008. Boards: does one size fit all? Journal of Financial Economics 87, 329–356.

Coles, J., Daniel, N., Naveen, L., 2014. Co-opted boards. Review of Financial Studies 27, 1751–1796.

Comprix, J., Muller, K.A., 2006. Asymmetric treatment of reported pension expense and income accounts in CEO cash compensation calculation. Journal of Accounting and Economics 42, 385–416.

Comprix, J., Muller, K.A., 2011. Pension plan accounting estimates and the freezing of defined benefit pension plans. Journal of Accounting and Economics 51, 115–133.

Core, J., Guay, W., 2010. Is CEO pay too high and are incentives too low? A wealth based contracting framework. Academy of Management Perspectives 24, 5–19.

Core, J., Holthausen, R., Larcker, D., 1999. Corporate governance, chief executive officer compensation, and firm performance. Journal of Financial Economics 51, 371–406.

Cremers, K.M., Grinstein, Y., 2014. Does the market for CEO talent explain controversial CEO pay practices? Review of Finance 18, 921–960.

Dechow, P.M., Sloan, R.G., 1991. Executive incentives and the horizon problem: an empirical investigation. Journal of Accounting and Economics 14, 51–89.

Edmans, A., Gabaix, X., Landier, A., 2009. A calibratable model of optimal CEO incentives in market equilibrium. Review of Financial Studies 22, 4881–4917.

Edmans, A., Liu, Q., 2011. Inside debt. Review of Finance 15, 75–102.

Faleye, O., Hoitash, R., Hoitash, U., 2011. The costs of intensive board monitoring. Journal of Financial Economics 101, 160–181.

Faulkender, M., Yang, J., 2010. Inside the black box: the role and composition of compensation peer groups. Journal of Financial Economics 96, 257–270.

Fich, E., Shivdasani, A., 2006. Are busy boards effective monitors? Journal of Finance 61, 689–724.

Gabaix, X., Landier, A., 2008. Why has CEO pay increased so much? Quarterly Journal of Economics 123, 49–100.

Gaver, J., Gaver, K., 1998. The relation between nonrecurring accounting transactions and CEO cash compensation. Accounting Review 73, 235–253.

Gerakos, J., 2010. Chief executive officer and the pay-pension trade-off. Journal of Pension Economics and Finance 9, 303–319.

Giroud, X., Mueller, H., 2010. Does corporate governance matter in competitive industries? Journal of Financial Economics 95, 312–331.

Gormley, T., Matsa, D., 2014. Common errors: how to (and not to) control for unobserved heterogeneity. Review of Financial Studies 27, 617–661.

Graham, J., Li, S., Qiu, J., 2012. Managerial attributes and executive compensation. Review of Financial Studies 25, 144–186.

Hartzell, J., Ofek, E., Yermack, D., 2004. What's in it for me? Personal benefits obtained by CEOs whose firms are acquired. Review of Financial Studies 17, 37–61.

Hoberg, G., Phillips, G., 2010. Real and financial industry booms and busts. Journal of Finance 65, 45–86.

Hoberg, G., Phillips, G., Prabhala, N., 2014. Product market threats, payouts, and financial flexibility. Journal of Finance 69, 293–324.

Jackson, S., Lopez, T., Reitenga, A., 2008. Accounting fundamentals and CEO bonus compensation. Journal of Accounting and Public Policy 27, 374–393.

Jensen, M., Murphy, K., 1990. Performance pay and top-management incentives. Journal of Political Economy 98, 225–264.

Jensen, M., Murphy, K., 2011. CEO bonus plans: and how to fix them. Harvard University and University of Southern California, Cambridge, MA, and Los Angeles, CA, Unpublished working paper.

Kalyta, P., 2009. Accounting discretion, horizon problem, and CEO retirement benefits. Accounting Review 84, 1553–1573.

Kaplan, S., Rauh, J., 2010. Wall Street and Main Street: what contributes to the rise in the highest incomes? Review of Financial Studies 23, 1004–1050.

Lazear, E., 1979. Why is there mandatory retirement? Journal of Political Economy 87, 1261–1284.

Lazear, E., Moore, R., 1984. Incentives, productivity, and labor contracts. Quarterly Journal of Economics 99, 275–296.

Lie, E., Heron, R., 2007. Does backdating explain the stock price pattern around executive stock option grants? Journal of Financial Economics 83, 271–295.

Morse, A., Nanda, V., Seru, A., 2011. Are incentive contracts rigged by powerful CEOs? Journal of Finance 66, 1779–1821.
Munnell, A., Soto, M., 2007. Why are companies freezing their pensions. Center for Retirement Research, Boston College, Boston, MA. Unpublished working paper 2007–2022.
Murphy, K., 1985. Corporate performance and managerial remuneration: an empirical analysis. Journal of Accounting and Economics 7, 11–42.
Murphy, K., 2002. Explaining Executive Compensation: Managerial Power Versus the Perceived Cost of Stock Options, 69. University of Chicago Law Review, pp. 847–869.
Murphy, K., Zabojnik, J., 2004. CEO pay and appointments: a market-based explanation for recent trends. In: American Economic Review Papers and Proceedings, 94, pp. 192–196.
Murphy, K., Zimmerman, J., 1993. Financial performance surrounding CEO turnover. Journal of Accounting and Economics 16, 273–315.
Naughton, J., 2015. Regulatory oversight and earnings management: evidence from pension assumptions. Northwestern University, Evanston, IL Unpublished working paper.
Oyer, P., 2004. Why do firms use incentives that have no incentive effects? Journal of Finance 59, 1619–1649.
Parrino, R., 1997. CEO turnover and outside succession: a cross-sectional analysis. Journal of Financial Economics 46, 165–197.
Petersen, M., 1994. Cash flow variability and firm's pension choice: a role for operating leverage. Journal of Financial Economics 36, 361–383.
Rauh, J., 2006. Investment and financing constraints: evidence from the funding of corporate pension plans. Journal of Finance 61, 33–71.
Rauh, J., Stefanescu, I., Zeldes, S., 2016. Cost shifting and the freezing of corporate pension plans. Stanford University, Board of Governors of the Federal Reserve System, and Columbia University, Stanford, CA, Washington, DC, and New York, Unpublished working paper.
Rosen, S., 1981. The economics of superstars. American Economic Review 71, 845–858.
Schultz, E., 2011. Retirement Heist: How Companies Plunder and Profit from the Nest Eggs of American Workers. Portfolio/Penguin, New York.
Schultz, E.E., McGinty, T., 2009. Pensions for executives on rise. Wall Street Journal. Retrieved from http://online.wsj.com.
Shivdasani, A., Stefanescu, I., 2010. How do pensions affect corporate capital structure decisions? Review of Financial Studies 23, 1287–1323.
Subramanian, A., 2013. Product market competition, managerial compensation, and firm size in market equilibrium. Management Science 59, 1612–1630.
Sundaram, R., Yermack, D., 2007. Pay me later: inside debt and its role in managerial compensation. Journal of Finance 62, 1551–1588.
Wei, C., Yermack, D., 2011. Investor reactions to CEOs' inside debt incentives. Review of Financial Studies 24, 3813–3840.
Weisbach, M., 1988. Outside directors and CEO turnover. Journal of Financial Economics 20, 431–460.
Yermack, D., 1995. Do companies award CEO stock options effectively? Journal of Financial Economics 39, 237–269.
Yermack, D., 1996. Higher market valuation of companies with a small board of directors. Journal of Financial Economics 40, 185–212.
Yermack, D., 2006. Golden handshakes: separation pay for retired and dismissed CEOs. Journal of Accounting and Economics 41, 237–256.