Pay Me Now (and Later): Pension Benefit Manipulation before Plan Freezes and Executive Retirement

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Abstract

Large U.S. companies modify the inputs of the benefit formulas of top executives' defined benefit pension plans before pension-related events. Companies provide one-time increases in pensionable earnings for top executives by boosting their annual bonuses by 18.5–33.4% one year before pension freezes and 43.7–59.4% one year before executive retirement. In contrast, we find no increases in equity awards (non-pensionable earnings) before these pension-related events. Moreover, firms lower plan discount rates when top executives are eligible to retire with a lump-sum benefit distribution. The rate reduction can be as large as 35 basis points for retiring executives with large pensions. Interestingly, we find pension-related bonus boosts and discount rate manipulation only at firms with weak corporate governance.

JEL classification: G31; G32; G34; M40

Key Words: Defined benefit pension plans; Pension freezes; Executive retirement; Executive annual bonuses; Plan discount rates

1. Introduction

Executive compensation at large public companies in the United States has been at the center of policy debate in recent years.[1] Most of the discussions focus on the level and structure of annual direct compensation (Jensen and Murphy, 1990; Yermack, 1995). This study investigates pensions as an important form of executive compensation. Although executives' pension values are comparable to their base salary, and are often substantially larger for long-tenured executives, only recently have executive pensions attracted academic attention.[2] Sundaram and Yermack (2007) are the first to estimate the actuarial value of the pensions of chief executive officers (CEOs) and to link pension values to the cash components of annual compensation. Whereas Sundaram and Yermack focus on the effect of executive pensions on corporate risk taking and executive retirement decisions, we are the first in the literature to examine whether firms increase pensionable earnings for top executives and make favorable actuarial assumptions on pension plans before pension-related events (e.g., plan freezes and executive retirement).

Most executive pensions are offered in the form of defined benefit (DB) pension plans. Under this arrangement, the sponsoring company promises to pay plan participants a fixed annual pension benefit upon retirement. The amount of the annual benefit is calculated as the product of the number of service years, pensionable earnings (i.e., covered compensation, which includes base salary and, almost always, annual bonuses, typically averaged over the final three

[1] For example, 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 increasing importance of managerial skills largely explain observed changes in the level and dispersion of chief executive officer (CEO) pay. That said, Bertrand and Mullainathan (2001); Bebchuk and Fried (2004); and Morse, Nanda, and Seru (2011) argue that CEO entrenchment and ineffective board monitoring are the causes of increased CEO pay.

[2] Because pension benefits are paid out only upon retirement, executive pensions had been mostly hidden from investors before December 15, 2006, when the Securities and Exchange Commission (SEC) began requiring public companies to disclose changes in the value of pension benefits for named executive officers (NEOs) in their proxy filings (the SEC final rules 33-8732a).

years of the employee's tenure), and a benefit factor (typically around 2%).[3] As both the number of service years and covered compensation tend to increase with executive tenure, by construction, the growth of accumulated benefits often accelerates over time.

In recent years, many sponsors froze 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 covered compensation stop growing (the so-called *hard freeze*); thus, earned pension benefits will remain at the capped level for the remaining tenure of the participants. As a result, top executives may press the board to elevate their pension benefits before the impending freeze to offset the loss of the expected benefit growth. Similarly, at executive retirement, both credited service years and pensionable earnings stop growing, and pension benefits become capped. Therefore, top executives may lobby the board for boosts to their pension payouts before their anticipated retirement to enhance the retirement packages. One approach to boost pension benefits before plan freezes and executive retirement is to make a one-time increase to pensionable earnings. We provide empirical evidence that firms tend to award large annual bonuses to top executives before these pension-related events.

Frequently, executives are allowed to take out the present value of pension benefits in a lump sum upon retirement. This possibility opens yet another avenue for executives to enhance their retirement packages, because a small reduction in the plan discount rate could substantially increase the value of the lump-sum payout. Thus, executives may lower plan discount rates (in addition to the boosts to the their annual benefits by the board) before retirement, despite the fact that such a rate reduction increases pension obligations and thus worsens the overall funding status of the firm's DB plans. We find that plan discount rates are lowered when top executives

[3] Suppose, for example, the benefit factor is 2%. An executive with an accumulated 25 years of service and covered compensation of $1 million has an annual pension benefit of $0.5 million (= $0.02 \times 25 \times 1$), which is 50% of the covered compensation.

are eligible to retire with a lump-sum option, further supporting the idea that these changes are implemented to benefit top executives.

We first examine executive annual bonuses before pension freezes. In our examination, we control for known economic determinants such as firm performance, complexity, risk, and executive responsibility. We further include industry-year fixed effects (two-digit SIC (Standard Industrial Classification) industry interacted with year) that take into account time-variant industry conditions (Gormley and Matsa, 2014) and, in alternative specifications, both year fixed effects and firm fixed effects that factor in the time trends as well as time-invariant and firm-specific characteristics that may affect bonus payouts (Graham, Li, and Qiu, 2012). We find that, on average, top executives receive boosts of 18.5–29.3% in annual bonuses one year before a DB plan freeze.

We acknowledge the possibility that some time-variant and firm-specific omitted variables may affect both the plan freeze and bonus award decisions. However, because firms that freeze their pension plans tend to perform poorly, their executives are expected to receive smaller annual bonuses. As a result, omitted performance-related firm characteristics are biased against our finding larger bonus awards right before pension freezes.

To further address endogeneity concerns, we use the propensity score matching (PSM) approach to construct a matched sample based on the propensity of a pension freeze, estimated using firm financial and pension characteristics one year prior to the freeze.[4] We match each freeze firm one year before its freeze to a firm in the same industry-year with the closest propensity score, and calculate the difference in executive annual bonuses within each matched pair. Such a pay difference is more likely driven by the freeze decision than by other economic

[4] See, for example, Petersen (1994); Munnell and Soto (2007); Beaudoin, Chandar, and Werner (2014); Choy, Lin, and Officer (2014); and Comprix and Muller (2011).

factors. We find an average boost of 33.1–33.4% in executive annual bonuses one year before pension freezes.

Moreover, we contrast equity awards with bonus payouts before pension freezes. If firms have reasons other than elevating pensions to boost executive bonuses (e.g., to provide incentives for managerial effort or satisfy the demand of entrenched managers), we should observe similar, if not larger, increases in equity awards, which typically outweigh bonus payouts (50–70% versus 15–20% of total annual compensation). As shown in Sundaram and Yermack (2007), however, annual bonuses are part of the covered compensation for the annual benefit calculation for 94% of DB plans, while restricted stock awards (or long-term incentive pay) are relevant for only 4% of DB plans. This institutional difference enables us to contrast the incentive to boost bonus awards with the lack of incentive to boost equity awards before a pension freeze. We do not expect to, nor do we, find boosts in equity awards before pension freezes.

Boosts in annual bonuses before pension freezes and the resulting increases in pension benefits add up to more than $400,000 for CEOs, which helps offset their loss of future benefit accruals. Our estimation shows that, on average, CEOs preserve 90% of their pension values had plan freezes not occurred. Given that our calculation leaves out alternative pensions awarded to top executives after the freeze of DB plans (e.g., 401(k) plans), we likely underestimate the extent of making whole for top executives. Even though making executives whole while deeply cutting the pension benefits of rank-and-file workers after plan freezes could be indicative of managerial entrenchment, it may be necessary to retain top executives (in addition to providing incentives for managerial effort) given the intense competition for managerial talent.[5] To test the

[5] Rauh, Stefanescu, and Zeldes (2015) show that freezing the DB plan generates considerable savings for the firm—about 3.5% of total payroll per year—even after accounting for additional contributions to supplementary defined contribution plans.

latter possibility, we conduct three sets of cross-sectional tests on the magnitude of bonus boosts before plan freezes.

First, we examine how corporate governance affects the extent of executive bonus boosts before pension freezes. If such bonus increases comply with optimal contracting, we expect to find greater bonus increases at firms with stronger governance. We construct an equal-weighted governance index based on seven indicators for board characteristics and ownership structure (Yermack, 1996; Core, Holthausen, and Larcker, 1999; Fich and Shivdasani, 2006; Coles, Daniel, and Naveen, 2008, 2014). We find bonus boosts (of 37.1–45.9%) before pension freezes only at firms with weak corporate governance.

Second, we test the predictions of incentive provisions under optimal contracting. We expect to find greater bonus awards when the freeze decision demands greater managerial effort—that is, when DB plans are more difficult to freeze (i.e., plans in good funding status and plans for unionized workers) and when freezing such plans is more important for the firm's success (plans with large liabilities relative to the firm's assets). We find no evidence supporting these predictions on incentive provisions around plan freezes.

Third, we test the predictions of retention incentives under optimal contracting. We expect to find greater bonus awards when the managerial labor market is more competitive—that is, when top executives have better outside options. Competitions are more intense in industries with a larger fraction of CEOs hired from outside (Cremers and Grinstein, 2014), when the stock price of firms in the same industry tends to co-move (Parrino, 1997), when the Herfindahl-Hirschman Index (HHI) of the industry is smaller (Hoberg and Phillips, 2010; Giroud and Mueller, 2010), and when the product market is more fluid (Hoberg, Phillips, and Prabhala, 2014). Our empirical results lend no support to these four predictions on executive retention.

Before executive retirement, at which time pension benefits are also capped, executives have incentives to press the board to award them with large bonuses. In an alternate setting, we classify an executive as retired if the executive's age exceeds one of the three most popular retirement ages: 60, 62, and 65 (e.g., Weisbach, 1988; Parrino, 1997; and Kalyta, 2009). We find an increase of 43.7–59.4% in annual bonuses, corresponding to a total increase in compensation by $1.0–1.3 million for CEOs, but no changes in equity awards for retiring executives one year before retirement.[6] We also show that such bonus increases are significantly greater than those for retiring executives at firms without DB plans, which helps link bonus boosts before executive retirement to pension benefits.

Our analysis of opportunistic behavior around executive retirement expands on another dimension: firms have the discretion to lower plan discount rates to increase the lump-sum payouts that executives can cash out at retirement.[7] DB plans for top executives typically consist of two parts: (1) qualified plans that are tax deductible but can cover only annual benefits up to the limit imposed by the Internal Revenue Service (IRS) (e.g., $205,000 in 2013), and (2) supplemental executive retirement plans (SERPs), which cover the remaining pension benefits.[8] For top executives of large U.S. companies, pension benefits under SERPs are typically much larger than those under regular qualified plans, and these plans may have different discount rates.

[6] "One of Exxon Mobil'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 to $US31m from $US23m." Source: Ellen E. Schultz and Tom McGinty, "Pensions for Executives on Rise," *WSJ*, November 3, 2009. Schultz (2011) includes more examples of managerial opportunistic behavior related to pensions.

[7] Under *Accounting Standards Codification 715*: *Compensation—Retirement Benefits* (FASB, 2009), employers have considerable discretion in determining the discount rates of DB plans for the purpose of measuring pension obligations. Comprix and Muller (2011) show that firms lower plan discount rates by 18 basis points (bps) prior to the Sarbanes-Oxley Act to exaggerate the economic burden before DB plan freezes.

[8] Contributions made to SERPs are not tax deductible. As a result, SERPs are typically unfunded and, in most cases, do not need to comply with the requirements of the Employee Retirement Income Security Act (ERISA).

The choice of the discount rates of DB plans is subject to several constraints. There are natural benchmarks for the discount rates. Historically, the discount rates for minimum lump-sum distribution of qualified plans were linked to the Treasury bond yield; starting on January 1, 2008, sponsors were required to transit from Treasury bond to high-quality bond yields, with an annual transition rate of 20% over a five-year period. In addition, discount rates for annuity payouts are often linked to the rates implicit in annuity contracts at which the pension obligation can be effectively settled, and these annuity rates are linked to high-quality bond rates (Naughton, 2015). Moreover, lowering the discount rates exerts pressure on the funding status of a firm's qualified plans, because it increases the present value of 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.[9]

Using manually collected data mainly from firms' proxy statements on plan discount rates, the lump-sum distribution option, and the retirement age specified in DB plans over the period of 2006 to 2013, we find that in years in which any top executive is qualified for retirement with a lump-sum distribution, the discount rate of the DB plan is, on average, lowered by 13 to 14 bps relative to benchmark rates. These results are obtained after controlling for year fixed effects, and are not driven by managerial behavior in any particular year of our sample period. In addition, we obtain similar results if the benchmark rate is included as an independent variable in the regression of the plan discount rate. More importantly, we find that the incentive to lower the discount rate is much stronger for executives who benefit the most: the discount rate is lower than the benchmark rate by 31 to 35 bps, on average, when retiring executives have

[9] For example, when Mr. Keegan retired from Goodyear Tire & Rubber Company in 2010 and took out all pension benefits in a lump sum, the discount rate of SERP decreased by 75 bps from the 2009 level, while the average decrease in the discount rate for all SERP sponsors in our sample from 2009 to 2010 was 47 bps and the average decrease in Moody's AA rate and CCBR rate over the same period was only 25 and 34 bps.

large expected pension benefits (in the top quintile), which corresponds to an increase in the lump-sum payouts by nearly $400,000 for top executives and half million dollars for CEOs. Note that this estimate is only a lower bound of the total costs to the firm, because all retirees who take lump-sum payouts in the same year will also receive greater payouts due to the reduction in the plan discount rate. Interestingly, we do not find downward biased plan discount rates at firms with strong corporate governance (in the top quintile).

Our paper is the first to document that a significant number of firms give favorable treatment to top executives' pension benefits before plan freezes and executive retirement. At the very least, such actions make it more difficult for investors to see the true compensation costs. Thus, our study is linked to the literature on problematic compensation practices such as stock option backdating (Lie, 2005; Lie and Heron, 2007), large special cash payments to target CEOs in mergers and acquisitions (Hartzell, Ofek, and Yermack, 2004), large separation pay for departing CEOs (Yermack, 2006), and biased selection of compensation peer groups (Faulkender and Yang, 2010; Bizjak, Lemmon, and Ngyuen, 2011). Our paper documents the feedback effect of pension-related events on executive annual bonuses. It adds to the 30-year-old literature on annual bonuses[10] and provides a different angle to the new line of research started by Sundaram and Yermack (2007) that links executive pensions to annual compensation.[11]

Our research also enriches the literature examining opportunistic managerial behavior in pension-related decisions. For example, firms are shown to use lower expected rates of return (ERRs) for DB plans to reduce income before CEO option grants and higher ERRs to increase

[10] See, for example, Murphy (1985), Gaver and Gaver (1998), Jensen and Murphy (2011), and Kim and Yang (2012).
[11] For instance, Cadman and Vincent (2015) show a positive correlation between DB pension benefits and excess annual compensation for CEOs. Gerakos (2010b) finds that an additional dollar of pension benefits is associated with a 48 cent decrease in pay. Gerakos (2010a) argues that the variation in pension levels is more likely due to optimal contracting than rent seeking. Kalyta (2009) shows income-increasing earnings management before CEO retirement if CEO pension is based on performance.

income before CEOs exercise stock options (Bergstresser, Desai, and Rauh, 2006) or sell shares in the open market (Comprix and Mueller, 2006). Furthermore, greater CEO interest in employee DB plans leads to higher funding levels and a lower probability of plan freezes (Begley, Chamberlain, Yang, and Zhang, 2015).[12]

The remainder of the paper is organized as follows. Section 2 presents the empirical strategy of our tests. Section 3 describes data and summary statistics and presents empirical results on bonus boosts before pension freezes and executive retirement. Section 4 documents the manipulation of plan discount rates when executives are ready to retire with a lump-sum distribution option of pension benefits. Section 5 concludes.

2. Empirical Strategy

Our empirical analyses include two sets of tests. We examine whether executive bonus payouts are boosted in anticipation of pension freezes and executive retirement and whether plan discount rates are lowered when executives are close to retirement and have the option to take pension benefits as a lump-sum distribution.

We first examine whether firms increase pensionable earnings for top executives before pension freezes. Pension freeze decisions are often negotiated with employees, retirees, and their unions over an extended period. As a result, when getting close to a resolution these events are fully anticipated by top executives, thus giving them the opportunity to influence the board's decision on their compensation that may counterbalance foregone growth in benefit accruals.

To this end, the board could credit executives with multiple years of services, increase base salary, or boost annual bonuses before DB plan freezes. However, leapfrogging service

[12] 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 equity and debt (Wei and Yermack, 2011).

years rarely happens, perhaps because it is more controversial and easily detectable. Salary increases have a more permanent effect on a firm's compensation expenses and thus are more costly to the firm. Increasing annual bonuses is less costly than an identical increase in salary, because it is a one-time payment. The board could do so by increasing the annual incentive pay (determined based on the performance metric specified in the annual incentive plan at the beginning of the year) or awarding discretionary bonuses (awarded upon the discretion of the boards, independent of performance). In theory, increasing annual incentive pay provides stronger incentives for managerial effort to improve firm performance. Yet, discretionary bonuses are typically determined at the end of the year, giving the boards the latitude to maneuver if the freeze decision is made later in the year. For example, Goodyear Tire & Rubber Company awarded its CEO, Mr. Keegan, annual bonuses of $12.3 million (of which $3.5 million was discretionary bonuses) in 2007, the year before the company froze its DB plans.[13]

Our baseline specification focuses on annual bonuses before a pension freeze:

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

where subscript *i* refers to the firm, subscript *j* refers to the executive, and subscript *t* refers to the time in years. We use the (anticipated) freeze event occurring one year ahead, *Pre Freeze*, as our main test event. For robustness, we examine annual incentive payouts and discretionary bonuses separately when both are reported, starting on December 15, 2006.

Our specification includes various control variables that are commonly known to affect annual bonuses. For instance, we include *Salary*, because target bonuses are typically expressed

[13] Robert Keegan joined Goodyear in October 2000 and received a service credit of 2.5 years for pension purposes for each year he was employed. Mr. Keegan received annual bonuses of $10.44 million in 2006, $12.3 million in 2007, and $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." Source: the proxy statement of Goodyear filed in 2007 at http://www.sec.gov/Archives/edgar/data/42582/000095015207001972/l23581adef14a.htm#126.

as multiples of base salaries (Kim and Yang, 2012). Following the literature on executive compensation (Core, Holthausen, and Larcker, 1999), we control for firm size (lagged *Sales*) and performance (current and lagged *ROA*, calculated as *EBIT* divided by total assets, and current and lagged stock *Return*), which are expected to be positively correlated with executive annual bonuses. We include two dummy variables related to recent income levels: *Negative Income* and *Income Increase* (Gaver and Gaver, 1998; Jackson, Lopez, and Reitenga, 2008). Furthermore, we include stock *Return Volatility*, the market-to-book ratio of equity (*M/B*), and *Leverage* as control variables. We also include an indicator for the CEO, because CEOs have greater responsibility and receive bigger bonuses than other NEOs in general.

In our regression analysis, we either include industry-year fixed effects to control for unobserved time-varying industry characteristics or include year fixed effects and firm fixed effects to control for time trends and unobserved time-invariant firm characteristics that may affect executive bonuses. Standard errors are clustered at the firm level. We further conduct a similar analysis on whether annual bonuses are boosted before executive retirement using an indicator, *Pre Depart*, for the year before executive departure and interacting it with proxies for retirement.

Our second set of tests examines DB plan discount rates relative to benchmark rates at executive retirement when lump-sum distributions are allowed. We examine qualified plans and SERPs separately, because some firms use younger ages to define retirement for SERPs than for qualified plans and apply different discount rates to these two types of plans. Retirement is defined based on the retirement conditions specified in the plan (separately for qualified plans and SERPs) at which all of the executive's pension benefits can be paid out. We classify a firm

year as a *Retirement* year if at least one NEO meets the retirement condition specified in the plan that year regardless of whether any executive actually leaves the firm.

To examine the effect of an executive's retirement with a lump-sum distribution on the pension plan discount rate, we use the following specification:

$$Discount\ rate_{it} - Benchmark\ rate_t = \alpha + \beta_1 \times Lump\ Sum_{it} + \beta_2 \times Retirement_{it} + \beta_3 \times Lump\ Sum_{it} \times Retirement_{it} + \eta_t + \varepsilon_{it}, \quad (2)$$

where *Lump Sum* takes the value of 1 if a lump-sum distribution of pension benefits is allowed at retirement and 0 otherwise. We cluster standard errors at the firm level.

We compare the discount rate of a DB plan with two pairs of benchmark rates. 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.[14] 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. We construct the weighted-average of the Treasury bond yield and two corporate bond rates—*the Moody's AA* corporate bond index and the IRS's Composite Corporate Bond Rate (*CCBR*)—based on the transition schedule governed by PPA 2006.[15] 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.

[14] Prior to enactment of the PPA 2006, sponsors were required to calculate a lump-sum distribution using interest rates based on 30-year Treasury bond yields.

[15] The CCBR data are available on the IRS website at https://www.irs.gov/Retirement-Plans/Composite-Corporate-Bond-Rate-Table. Using the Corporate Bond Weighted Average Interest Rate yields similar results.

Next, we measure the deviation of the plan discount rate from each of the two constructed (weighted-average) benchmark rates and examine whether the deviation becomes larger (more negative) at firms when their top executives are ready to retire and take out pension benefits in a lump sum. We further calculate the deviation of the plan discount rate from each of the *Moody's AA* corporate bond index and the *CCBR* because DB plans with annuity payouts link their discount rates to high-quality bond rates.

3. Bonus Boosts before Pension Freezes and Executive Retirement

3.1 Data and Summary Statistics

Our sample construction starts with firms covered by the Standard & Poor's ExecuComp database—that is, all current and past S&P 1500 index components. The annual compensation table of ExecuComp includes detailed information on base salary, annual bonuses, restricted stock, stock options, and other incentive payments for the NEOs. For the period from 2000 to 2013, ExecuComp covers 2,807 unique firms, of which 1,624 offer DB plans to their employees based on the pension annual table of Compustat. We further require sample firms to have at least one Form 5500 filing with matched *GVKEY* during our sample period, which reduces the sample to 1,095 firms. For these firms, we extract firm (executive) years with required information on the variables used in our regression analysis: positive pension liabilities as reported in 10-K (*PBPRO* in Compustat) and non-missing salary, annual bonuses, sales, ROA, net income, net income increase, stock return, market-to-book ratio, leverage, return volatility, and a CEO indicator. Financial data are extracted from Compustat and stock returns from the Center for Research in Security Prices (CRSP). These requirements reduce our sample of firms with DB plans to 1,084 firms, corresponding to 13,850 executives and 61,831 executive year observations.

We identify plan freezes from IRS Form 5500, which is filed by all sponsors at the plan level. The form includes detailed financial information about the plan and its funding status. In

particular, the form identifies all plans that are frozen in a given year. *Hard freezes* entail a complete stop of pension accruals. In contrast, *soft* (i.e., *partial*) *freezes* typically involve a slowdown in the growth of plan level liabilities or the closure of the plan to new participants. The check box in Form 5500 refers to *hard freezes*, and the disclosure became mandatory in 2002. We further check the freeze date in the plan description paragraph that is typically available in the attachments to Form 5500. During the period from 2000 to 2013, 207 of the 1,084 firms with DB plans froze 251 of their plans. Because Form 5500 is not publicly released for two years following the filing with the IRS, our sample of freezes for 2012 and 2013 is incomplete. Similarly, because the Form 5500 disclosure of pension freezes that occurred prior to 2002 was voluntary, our sample of plan freezes in 2000 and 2001 is also incomplete. Figure 1A depicts the annual distribution of these freeze events and Figure 1B the industry distribution.

Table 1 reports the summary statistics on key variables. We compare firm characteristics of those firms that froze their pension plans one year before the freeze with those of other firm years, and find that these firms tend to have lower *ROA* and stock returns (contemporaneous and lagged), lower market-to-book ratio, negative net income and no income increases, and more volatile stock returns and cash flows. Regarding pension characteristics, we show that 83.2% of the firms that froze their DB plans have overall underfunded plans in the year before the freeze, in contrast to 78.5% for the remaining firm years. We code *Underfunded* as 1 if the overall funding ratio of a firm's DB plans (*PPLAO*/*PBPRO* in Compustat) is below 1 and 0 otherwise. One year before the freeze, firms have significantly larger pension plans and thus greater anticipated savings on average (with the projected pension benefit obligation equal to 20.1% of the firm's total assets, compared with 15.6% for the remaining firm years), and 8.4% of freeze firms have DB plans that are all unionized, smaller than the 14.4% for other firm years.

These summary statistics suggest that firms that freeze their pension plans have difficulties meeting their pension funding requirements. Given the observed poor performance, top executives at those firms are expected to receive low compensation. However, we find that both base salary and bonus payouts are significantly higher in the year before a pension freeze. For example, executives receive an average of 15.3% (a median of 23.2%) more pay in annual bonuses before a plan freeze. To determine whether firms pay excessive annual bonuses in anticipation of a pension freeze, we need to control for firm characteristics (e.g., size), because firms that freeze their DB plans are typically larger and may pay their talented managers more.[16]

3.2 Executive Annual Bonuses before Pension Freezes

In this subsection, we investigate the potential manipulation of annual bonuses before a pension freeze with multivariate regression analysis. Using the empirical specification of Equation (1), we run panel regressions with Ln (1 + *Bonus*) in thousands of dollars as the dependent variable. Our main variable of interest is the impending plan freeze, *Pre Freeze*. Essentially, we test whether the level of executive annual bonuses is abnormally high in the year before a freeze.

We report the results in Table 2. Columns 1 and 2 include all ExecuComp firms offering DB plans, while columns 3 and 4 include only those that froze their DB plans over our sample period. Using the subsample of firms that froze their DB plans allows us to compare executive bonus levels around the freeze event conditional on the freeze decision. Columns 1 and 3 include

[16] Appendix B includes the correlation matrix among key variables used in our regression analyses. *Pre Freeze* is positively correlated with executive annual bonuses, base salary, firm sales, total assets, negative net income, and (industry) cash flow volatility, and it is negatively correlated with *ROA*, lagged *ROA*, net income increase, stock returns, return volatility, *M/B*, and leverage. Regarding plan characteristics, we find that *Pre Freeze* is positively correlated with the plan's underfunded status and the relative size of pension obligations, and negatively correlated with the plan's unionized status. Note that the correlation between the pension freeze dummy and equity awards is not statistically significant.

(two-digit SIC) industry-year fixed effects, and columns 2 and 4 include year fixed effects and firm fixed effects.

The coefficient estimate of *Pre Freeze* is positive and statistically significant in all regressions. The results are stronger for the subsample of firms that froze their pension plans. For example, under model (4), which includes year fixed effects and firm fixed effects, we find that firms, on average, award their top executives 29.3% more in annual bonuses in the year prior to a pension freeze after controlling for other determinants of annual bonuses. The coefficient estimate is statistically significant at the 1% level.[17]

Control variables have the expected signs. For example, executive bonuses are highly and positively correlated with salaries because annual bonuses are often expressed as a percentage of base salary. Economically, for an increase of 1% in base salary, annual bonuses increase by 1.1%. Bonuses increase with *ROA*, *Income Increase*, and current and lagged stock *Return*, and they decrease with *Negative Income*, *Return Volatility*, and *M/B*.[18]

Using the median value of each measure for CEOs in our sample, we estimate that a boost of 0.293 in Ln (1+ *Bonus*) before pension freezes increases the total amount of compensation by $0.43 million, of which about half is due to the increase in the bonus payout and another half is the resulting increase in the present value of pension benefits. In addition, we estimate that boosts in annual bonuses allow executives to preserve 90% of the pension value

[17] It is possible that greater bonus awards 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 final three years, for example, top executives have incentives to boost their bonuses in years leading up to the pension freeze even though the freeze decision is more uncertain well before the freeze year. Moreover, executive bonuses may remain at the boosted level after the freeze. We examine annual bonuses awarded from three years before to two years after the freeze and find that boosts in annual bonuses are one-time extra payments that occurred only one year before the freeze. Bonus awards revert to the normal level during the freeze year (untabulated). The finding of the one-time boosts to bonuses right before plan freezes helps us link such behavior to executive pensions.

[18] In column 3, the CEO dummy is negative and statistically significant. This sign may appear counterintuitive. Note that salary is included as an independent variable in the regression and CEOs tend to receive greater salary payment than other NEOs. The loading of the CEO dummy is 0.723 and significant (at the 1% level) if we omit salary from the right hand side of the regression.

that they would have received in the absence of the freeze (and in the absence of bonus manipulation).[19] Given that our calculation leaves out alternative pensions awarded to top executives after the freeze of DB plans (e.g., 401(k) plans), we likely underestimate the preservation ratio of executive pension benefits.

One potential concern is that pension freezes and bonus award decisions are endogenously determined; that is, firms that freeze their pension plans may differ systematically from those that do not, and these differences may lead to the observed difference in bonus awards. Note that models (3) and (4) include only firms that chose to freeze their pension plans. In addition, models (1) and (3) include industry-year fixed effects and models (2) and (4) include year fixed effects and firm fixed effects to control for various unobserved variables that may affect annual bonus awards. Moreover, in untabulated tests using executive fixed effects to replace firm fixed effects in models (2) and (4), we find slightly stronger results: the coefficient of *Pre Freeze* becomes 0.256 and 0.305, respectively.[20]

[19] 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 boost 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 1000$), which in turn increases the annuity of pension benefits by $27,491 (= 0.02 × 18 × 229,088 / 3). Using a PV factor of 7.17 (which takes into account the official mortality rates for males, by age), this increases the present value of pensions in the year before the freeze by $196,289. Thus, the total amount of compensation increase is $425,377 (= 229,088 + 196,289) valued one year prior to the freeze. Assume that salary and bonus 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 boost not occurred. Bonus boosts and the resulting increases in pension value recover about 46% of the loss. The resulting ratio of the present value of pension benefits with a freeze and bonus boosts to that without a freeze and bonus boosts is 90%.

[20] The bonus boost results are similar if we keep 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 boost annual bonuses. In our sample, 94 out 251 plan freezes are accompanied by SERP freezes. We add an indicator of *SERP Freeze* and *SERP Freeze* × *Pre Freeze* into Equation (1). Under specifications (2) and (4) of Table 2, 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 0.024 and –0.012, not statistically different from zero (untabulated).

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 examine the effect of pension freezes on bonus awards between freeze firms and their matching counterparts.

3.2.1 Propensity Score Matching Model

To predict the likelihood of a pension freeze, we include cash flow volatility in addition to size, accounting and stock performance, market-to-book ratio, and leverage as independent variables because Petersen (1994) shows that firms with more volatile cash flows are less likely to retain DB plans. Cash flow volatility is calculated using annual data over the past 10 years. We use the median level of firms in the same industry (two-digit SIC code) in the year prior to the freeze. As the literature shows that the underfunding level 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). Lastly, we include *Relative Pension Size* as a predictor of the freeze because firms with large pension plans are more likely to see a bigger effect of a pension freeze on cash flows (Munnell and Soto, 2007). We include year fixed effects and industry fixed effects to control for potential freeze waves and industry characteristics omitted in the specification that may affect the freeze decision. Standard errors are clustered at the firm level. Because factors that affect the plan freeze decisions may differ (e.g., firms start paying more attention to risks) after the Great Recession, 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 1 if a firm will freeze its DB plan the following year and 0 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 Munnell and Soto (2007) and Rauh,

Stefanescu, and Zeldes (2015). Interestingly, we find that while larger firms and firms with lower growth potentials tend to freeze their DB plans before the Great Recession, firms in industries with more volatile cash flows are more likely to freeze their DB plans after the Great Recession.

Matching is done within year and two-digit SIC industry without replacements. For each freeze event, we find a firm that is not freezing its DB plan that year and that has the nearest propensity score, which is within a caliper of 0.25 times the standard deviation of the estimated propensity scores (approximately 0.6%).[21] We are able 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. Panels C and D show that treatment and control firms are comparable in all factors that affect pension freezes. The *t*-test and median test reported in Panel E show that executive bonuses prior to plan freezes are larger than those in matched firm years by 24.8% (*p*-value = 0.012) and 9.7% (*p*-value = 0.216), respectively.

Using this matched sample, we run a multivariate regression of annual bonuses on the pension freeze indicator, *Pre Freeze*, and all control variables used 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 that with industry-year fixed effects; both are statistically significant at the 5% level.[22] Overall, the PSM results confirm our findings under the ordinary least squares specifications that firms boost executive bonuses prior to pension freezes.

[21] Results are similar if we allow replacements in matching (205 matched pairs). Given that the mean (median) of the propensity to freeze a DB plan is 4.2% (3.6%), we also use calipers of 0.1% and 1% and obtain coefficient estimates of 0.400 (135 matched pairs) and 0.297 (221 matched pairs) for *Pre Freeze*, respectively. Results are statistically significant at the 5% level in these alternative settings.

[22] We also run the second-stage regressions separately for freezes that occurred during 2000–2007 and 2008–2013. We find stronger results (untabulated) 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 latter period if we exclude 2009 (which coincide with smaller bonuses awarded in 2008). Furthermore, the coefficient estimates for *Pre Freeze* are significant, about 0.5, if we examine discretionary bonuses for freezes that occurred during 2008–2013.

An alternative explanation for our bonus boost finding is that perhaps executives always demand high compensation and the observed boosts in annual bonuses prior to a pension freeze could be driven by some unobservable factors that are not captured by the fixed-effect models or the PSM model. If this is indeed the case, we should observe similar boosts in other compensation components such as stock and options. In the next subsection, we test whether the impending pension freeze is associated with more generous equity awards.

3.2.2 Equity Awards before Pension Freezes

Equity awards are rarely considered pensionable earnings (included in the calculation of pension benefits for only 4% of DB plans; see Sundaram and Yermack, 2007). If firms increase bonuses before plan freezes for reasons other than lifting pensions (e.g., incentive provisions or agency problems), we would expect to find similar, if not larger, increases in equity awards.

Our research design on equity awards is the same as the one on bonus awards prior to a pension freeze, replacing bonus by equity in Equation (1). The regression results are presented in Table 4. Columns 1 and 2 include the sample of all firms with DB plans at some point between 2000 and 2013, while columns 3 and 4 focus on firms that froze their DB plans during this period. In contrast to our findings of boosts in annual bonuses, we find no evidence of boosts in equity awards in the year before a pension freeze. This lends further support to the view that executive annual bonuses are boosted to enhance pension benefits before plan freezes.

3.2.3 Channels for Boosting Pensionable Earnings

The board of directors could raise pensionable earnings by increasing base salary or annual bonuses (annual incentive pay plus discretionary bonuses). Each approach has its advantages and disadvantages. Salary increases do not provide incentives for managerial effort. Increasing salary is more costly to the firm, because it is mostly irreversible and several other

compensation components (e.g., target bonus payout and severance pay) are often expressed as multiples of salaries. Base salary may also exceed the one million dollar cap for tax deductions. Moreover, salary increases may not be feasible if the freeze decision is made later in the pre-freeze year. As reported in column 1 of Table 5, we do not find salary increases for top executives before pension freezes.

Increasing annual incentive pay provides incentives for managerial effort, but the board may not be able to modify the performance metric beyond the first quarter of the pre-freeze year. Increasing annual incentive pay may also induce earnings management (accrual-based or distortion in real investment) ex post. In contrast, discretionary bonuses provide incentives for neither managerial effort nor earnings management. Discretionary bonuses are one-time extra payments, and are therefore at the will of the board. The two components of annual bonuses have been separately reported starting on December 15, 2006. Since then, we find that annual bonuses increase by 35.4% before pension freezes, mainly driven by the 45.9% increases in discretionary bonuses, much larger than the 8.6% increases in annual incentive pay. This suggests that discretionary bonus awards are the most likely channel for boosting pensionable earnings.[23]

3.2.4 Optimal Contracting versus Managerial Rent Seeking

Making executives whole after pension freezes is consistent with both optimal contracting and managerial rent seeking views. In this subsection, we distinguish these two possibilities. Based on optimal contracting, executive compensation plans are designed to provide incentives for managerial effort and help retain top executives given intense competition

[23] ExecuComp modified the definition of annual bonuses. 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* afterwards. 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 test on bonus boosts for pension purposes.

for managerial talent. Accordingly, under the optimal contracting hypothesis we expect to find greater bonus boosts before pension freezes when corporate governance is stronger, when the freeze decision demands greater managerial effort, and when the competition for talent is more intense and top executives are harder to retain.

A. Effect of Corporate Governance on Bonus Boosts

To examine how the strength of corporate governance affects the magnitude of bonus boosts before pension freezes, we construct an equal-weighted governance index using seven indicators based on board characteristics and ownership structure relative to the sample median: board size (−), fraction of independent directors (+), fraction of busy directors (−), fraction of co-opted directors (−), CEO/chairman duality (−), outside directors' ownership (+), and institutional ownership (+).[24] A firm is defined as having strong governance if its governance index is greater than 4 (in the top quintile). We find that when corporate governance is not strong, top executives receive bonus boosts before pension freezes. For example, the coefficient estimate for *Pre Freeze* is 0.459 (statistically significant at the 1% level) in column (4) of Table 6. In contrast, top executives at firms with strong governance do not receive bonus boosts before pension freezes (0.459 – 0.649 = – 0.19; *p*-value = 0.469).[25]

B. Incentive Provisions for Managerial Effort

If bonus boosts before pension freezes are intended to provide incentives for managerial effort, we expect to find greater bonus increases when the freeze decision demands greater managerial effort—i.e., when those DB plans are more difficult to freeze (i.e., plans in good funding status and plans for unionized workers) and when freezing such plans is more important

[24] For example, a board with fewer directors tends to monitor more effectively; thus, board size contributes negatively to the governance strength index (Yermack, 1996).

[25] In an untabulated test, we find neither boosts nor reductions in executive annual bonuses before pension freezes at firms with a governance index greater than 3 (corresponding to firms in the top half of governance strength).

for the firm's survival and success (large pension plans). We add indicators *Underfunded* (to indicate the overall status of a company's DB plans) and *Unionized* (to indicate if all DB plans of the firm are for unionized workers),[26] and *Relative Pension Size*, as well as each of their interactions with *Pre Freeze*. We expect to find a negative sign for *Underfunded* × *Pre Freeze* and a positive sign for the other interaction terms. As reported in Table 7, none of the interaction terms have significant coefficient estimates, even though all have the predicted sign. Overall, these results do not support the incentive provision predictions.

C. Incentive Provisions for Retention Purposes

If bonus boosts before pension freezes and making executives whole are mainly used to retain top executives, greater bonus boosts should occur when competition for managerial talent is more intense and when managers have better outside options. Thus, we expect to find greater bonus boosts before pension freezes 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 HHI for the industry is smaller (−), and when the product market is more fluid (+).

Cross-sectional data at industry level on outside CEOs (*Outside CEOs*) across the Fama and French classification of 48 industry groups are from Table III of Cremers and Grinstein (2014). Cross-sectional data at industry level on stock return *Co-movement* are calculated based on monthly stock returns between 1999 and 2012 of all CRSP firms within two-digit SIC industries, following Parrino (1997).[27] Panel data at industry year level on *HHI* 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 at firm year level

[26] Our results are similar if we use alternative unionization measures (1) an indicator of 1 if at least one DB plan is unionized, (2) the fraction of DB plans that are unionized, and (3) the fraction of ABO under unionized plans.
[27] Following Parrino (1997), we use an equally-weighted return index; a value-weighted return index yields similar results.

on *Fluidity*, which captures changes in rival firms' products relative to the firm's products and is derived from firms' product text descriptions in 10-K filings (Hoberg, Phillips, and Prabhala, 2014), are downloaded from Hoberg and Phillip's website.[28]

Panel A of Table 8 describes the four measures of market competitiveness. Adding those competition 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, while those of *Pre Freeze* × *Co-movement* and *Pre Freeze* × *Fluidity* have a sign opposite to predicted.[29, 30] Overall, we find no support for the executive retention predictions.

In summary, our cross-sectional tests on bonus boosts before DB plan freezes do not lend support to the predictions of optimal contracting. However, the board of directors seems to have adopted the most effective way to increase pensionable earnings before plan freezes: awarding discretionary bonuses.

3.3 Annual Bonuses before Executive Retirement

In this subsection, we examine whether annual bonuses are boosted before executive retirement. An executive may influence his bonuses before a planned retirement but perhaps not before a forced departure. We follow the literature on CEO turnover (Weisbach, 1988; Parrino, 1997; Kalyta, 2009) and use 60, 62, and 65 as proxies for retirement ages, which are also the most popular retirement ages based on DB plan specifications, as described in Section 4.1. Anticipating retirement in the near future, an executive has an incentive to increase annual

[28] http://hobergphillips.usc.edu/industryconcen.htm.

[29] We omit firm fixed effects from columns 1 and 2, or *Outside CEOs* and *Co-movement* would be dropped out from the regressions, because both are cross-sectional measures, which do not vary over time.

[30] *Outside CEOs*, *Co-movement*, *HHI*, and *Fluidity* are continuous variables. As a robustness check, and to avoid measurement errors, we sort each variable into three groups at the 30 and 70 percentiles and compare the size of bonus awards across groups. Again, we find no supportive evidence of bonus awards for retention purposes.

bonuses to boost pension benefits. We test this hypothesis on a subsample from 2000 to 2008, given the availability of departure data in ExecuComp, and contrast bonus with equity awards.[31]

The results are presented in Panel A of Table 9. We find an increase of 43.7–59.4% in annual bonuses for executives who are ready to retire, as reflected in the positive and significant coefficient estimates of the interactions of *Pre Depart* with all three proxies for impending retirement.[32] Provided that the retirement condition is met, executives receive, on average, a boost in annual bonuses of 19.7% to 34.3% (= 0.594 – 0.251), but no increases in equity awards. These findings are consistent with managerial incentives to boost annual bonuses before their pension benefits get capped.

There could be drivers other than pensions for the increases in annual bonuses before executive retirement (Yermack, 2006).[33] We might 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 those at all ExecuComp firms (regardless of whether the firm has a DB plan). We show in Panel B that bonus boosts before

[31] ExecuComp stopped collecting executive departures dates (*LEFTCO* and *RELEFT*) after 2009 as a result of inconsistency in reporting because this information was not required to be disclosed. *LEFTOFC* indicates the date on which a CEO left the corner office. We rule out NEOs who stay at the firm after leaving the CEO position by checking whether NEOs receive annual compensation after the date indicated by *LEFTOFC*.

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

[33] Boosts in annual bonuses before executive retirement could also be driven by severance pay. The severance pay data are available in ExecuComp starting only in December 2006, and the executive departures data end in December 2008, which allows us to study bonus boosts in the presence of severance pay only during the period from December 2006 to December 2007. For this subsample, we find that bonus payouts before retirement are significantly greater when severance pay exists. In addition, we find that bonuses increase by 22.9% before retirement (defined based on a retirement age of 65) using a model with year fixed effects and firm fixed effects. However, such boosts are not statistically different from zero at a conventional level, regardless of whether the severance pay dummy is included.

executive retirement (using retirement ages of 60 and 62) are significantly greater at firms with DB plans than those at all ExecuComp firms.[34]

Having shown that firms tend to boost annual bonuses before pension freezes and executive retirement, we next examine whether firms modify other plan assumptions before pension-related events. Comprix and Muller (2011) show that firms lower plan discount rates (and ERRs) before freezing their DB plans to exaggerate the economic burden. We examine whether firms lower plan discount rates when their top executives are ready to retire and exercise the option to take out pension benefits in a lump sum.

4. Discount Rate Manipulation at Executive Retirement

4.1 Data and Univariate Analysis

Information on plan discount rates, the lump-sum distribution option, and retirement conditions is extracted from the proxy statements (DEF-14A, in the section of *Retirement Benefits* or *Pension Benefits*) for most firms, and from 10-K(/A) filings for some small firms. The number of accredited service years and the present value of pension benefits are contained in the pension benefits table of ExecuComp. All of these data items are available starting on December 15, 2006, when the SEC enhanced disclosure requirements. Thus, our sample for the discount rate examination is constructed over the period from fiscal year 2006 to 2013.

Out of the 5,563 firm year observations (corresponding to 873 unique firms) that have information on retirement conditions and the lump-sum distribution option, 5,139 firm years have qualified plans and 4,988 have SERPs. In our sample, 2,820 firm years (corresponding to

[34] 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 R&D, 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.

480 unique firms) disclosed the discount rates of DB plans in the DEF-14A or 10-K(/A) filings. When discount rates of DB plans involving top executives are not disclosed (2,743 firm years, corresponding to 517 unique firms), we fill in the discount rate using the weighted-average discount rate over all DB plans of the firm listed in the 10-K filing (*PBARR* in Compustat). The discount rate for qualified plans has an average of 5.41% and a median of 5.60%, and the discount rate for SERPs has an average of 5.33% and a median of 5.50%.

Among the 873 unique firms in our sample, 64% allow for lump-sum distribution of pension benefits and 36% do not. For qualified plans, the discount rate for lump-sum distribution differs from that for annuity payments in 270 cases. As shown in Panel A of Table 10, the mean and median discount rates are 5.37% and 5.50% for lump-sum distribution and 5.48% and 5.75% for annuity payments. For SERPs, the discount rate for lump-sum distribution differs from that for annuity payments in 451 cases. The mean and median discount rates are 5.26% and 5.45% for lump-sum distribution and 5.45% and 5.70% for annuity payments. Overall, plans allowing lump-sum distribution tend to have lower discount rates, and the average gap between the lump-sum and the annuity rates is larger for SERPs than for qualified plans.

Among firm years with qualified DB plans (SERPs), retirement at which all pension benefits can be paid out is defined based on a single age in 83.0% (80.7%) of the cases and a combination of age and service years in 13.0% (14.3%) of the cases. The remaining 4.0% (5.0%) of the observations have multiple retirement ages or age service year combinations applied to different plans or different executives. As shown in Panel B of Table 10, the most popular retirement ages are 65 (71.6% of observations), 62 (19.5%), and 60 (6.9%), with a minimum of 55, a maximum of 66, an average of 63.9, and a median of 65 years for qualified plans. For SERPs, the most popular retirement ages are 65 (62.1% of the sample), 62 (21.6%), and 60

(12.2%), with a minimum of 55, a maximum of 72, an average of 63.5, and a median of 65 years. Figure 2 shows the number of firms with any executive at or above the retirement age for pension purposes, by plan type and year.

We calculate the deviation of the discount rate of a DB plan from four benchmark rates: one pair of constructed rates and one pair of corporate bond rates (*Moody's AA Rate* and *CCBR*). The constructed rate is the weighted-average of the Treasury bond yield and one of the two corporate bond rates based on the transition schedule given in PPA 2006. We winsorize all continuous variables at the 1st and 99th percentiles and report the mean and median rate difference based on whether lump-sum distribution is allowed and whether any NEO meets the retirement condition of the DB plans during the year.

Panel C reports the results on plan discount rates in excess of each of the two constructed rates. The top panel shows discount rate deviations from the benchmark when *Retirement* = 1, and the bottom panel shows such deviation when *Retirement* = 0. When any top executive is ready to retire, the discount rates of qualified plans with a lump-sum distribution option are, on average, lower than those of plans without such an option by 19 to 20 bps. In contrast, when no executives satisfy the retirement condition, the discount rates of qualified plans allowing lump-sum distribution is lower than those not allowing it by 6 to 7 bps. The contrast is more prominent for SERPs. When any top executive is ready to retire, the discount rates when lump-sum distribution is allowed are lower than those when it is not allowed by 28 to 29 bps. In contrast, when no executives satisfy the retirement condition, the discount rates for plans with a lump-sum distribution option are, on average, lower than those for plans without such an option by 13 bps. Panel D reports the results on plan discount rates in excess of *Moody's AA Rate* and *CCBR*. We

find that, again, plan discount rates are lower when at least one NEO is ready to retire with a lump-sum distribution option, and such a pattern is more prominent for SERPs.

Panel A of Figure 3 depicts the average discount rates for qualified plans and SERPs, two constructed benchmark rates, and the Treasury bond yield. The unusual pattern of the Treasury bond yield during the Great Recession due to a flight to safety affects the patterns of the two constructed rates. Panel B shows that the average discounts rates of DB plans generally lie between the *CCBR* and *Moody's AA* rates, with SERP rates below qualified plan rates.

4.2 Regression Analysis

Using the regression model specified in Equation (2), we examine the discount rates of DB plans (qualified plans and SERPs) in excess of the benchmark rates based on whether there is executive retirement and whether lump-sum distribution is permitted. We expect to find lower discount rates at firms with a lump-sum distribution when any NEO is ready to retire. We include year fixed effects and cluster standard errors at the firm level. Our regression results are presented in Table 11, in which Panel A uses constructed rates and Panel B uses corporate bond rates as the benchmarks. The coefficient estimate of *Lump Sum* × *Retirement* is negative and statistically significant at better than the 5% level in all eight specifications. Relative to cases in which lump-sum distribution is not permitted, firms with a lump-sum distribution option lower the discount rates of their qualified plans and SERPs by 13 to 14 bps on average when any NEO is ready to retire. Conditional on executive retirement, the discount rates of SERPs are, on average, lowered by 25 bps (= – 0.109 – 0.14; column 3) when lump-sum distribution is permitted. In contrast, the discount rates of qualified plans are lowered by 18 bps (= – 0.037 – 0.141; column 1) when the lump-sum distribution option is available.

Our results are robust to various specifications. For example, lowering discount rates is not concentrated in any particular year of our sample period (untabulated). Moreover, if we use the benchmark rate as an independent variable in the plan discount rate regression, allowing its coefficient to differ from 1, we find a similar extent of discount rate manipulation when top executives are ready to retire with a lump-sum distribution (untabulated).[35] In the absence of year fixed effects, the coefficient estimates of the high-quality bond rates are very close to 1.

Having shown that plan discount rates are low relative to benchmark rates when executives are ready to retire with a lump-sum distribution option, we next examine whether such an incentive is stronger when the retiring executives have larger pension packages. We measure pension value by the present value of total pension benefits (ExecuComp variable *PENSION_VALUE*) in the year prior to the executive retirement, and we scale it by the executive's base salary. If there are multiple retiring NEOs that year, we aggregate the pension values over all retiring executives. This measure takes into account the number of retiring executives and the size of their stakes.[36] We sort firms into three groups. The omitted group includes firms without executives retiring that year, which have the weakest incentive to lower the discount rates of their DB plans. Among firms with retiring executives, we divide them into the top quintile (*Group 1*) and the remaining quintiles (*Group 2*) based on the amount of retiring executives' pension benefits.

Results presented in Table 12 show that the plan discount rate is on average lower than the benchmark rate by 31 to 35 bps for firms with the strongest incentive to lower the discount

[35] 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 (untabulated). In a placebo test, we replace plan discount rates for top executives disclosed in DEF-14A by the weighted-average discount rate for all pension plans reported in 10-K (*PBARR* in Compustat), and we do not find manipulation of plan discount rates at executive retirement with a lump-sum distribution option (untabulated).

[36] Our results are robust if we use the maximum pension value among all retiring executives (untabulated).

rates (firm years in *Group 1*) and by 12 to 16 bps for firm years with some incentives to lower the discount rates (firm years in *Group 2*). Both are statistically different from the omitted group that has no executive retirement. The differences between groups 1 and 2 are statistically significant at the 10% level for SERPs.[37]

Economically, using the median present value of DB plans of those top executives (CEOs) with large pensions in the year prior to their retirement, about $13.8 million ($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 $379,098 ($464,330) for male executives (CEOs) based on the mortality tables by gender. Lowered plan discount rates, compounded by bonus boosts before retirement, could make the lump-sum distribution to retiring executives substantially more valuable.

The above findings of downward biased plan discount rates in years in which top executives are ready to retire and cash out pension benefits could be driven by two factors. First, the management acts opportunistically to lower plan discount rates in order to award retiring executives more generous packages. Second, executives who meet plan retirement conditions choose to retire in years in which plan discount rates are low. Note that if the executives time their retirement, they should pay attention to plan discount rates themselves (= deviation of plan discount rates from benchmark rates + benchmark rates) instead of the deviation of plan discount rates from the benchmarks. Moreover, *retirement* in our regression analysis is defined ex ante—

[37] There are 496 firm years in our sample that have only qualified plans, which makes the size of the pension benefits of their top executives small relative to those with SERPs, given that our pension size measure is the aggregated value over all plans. However, incentives to reduce the discount rates of qualified plans when executives retire with a lump-sum distribution in these cases can be strong because the size of their qualified plans may be large relative to that of other executives' qualified plans. If we leave out these 496 observations, the manipulation of qualified plan discount rates in *Group 2* is much smaller than that in *Group 1*, and the difference between the two groups is statistically significant at the 10% (5%) level for the specifications using the constructed benchmark rates (corporate bond rates).

that is, when at least one NEO meets the retirement condition specified in the DB plan, regardless of whether any executive actually leaves the firm that year.[38]

To further distinguish these two possibilities, we examine how corporate governance affects the extent of plan discount rate reductions when executives are ready to retire with a lump-sum distribution. If the agency problem hypothesis is true, we are less likely to observe such opportunistic behavior at firms with strong governance. In contrast, under the retirement timing hypothesis, we do not expect the extent of plan discount rate reductions to vary with the strength of corporate governance. Using the governance index described in Section 3.2.4, we find that firms ranked in the top quintile of governance strength (governance index > 4) do not lower plan discount rates when their top executives retire with lump-sum distribution option (Panels A and C of Table 13), but firms with weak corporate governance do (Panels B and D of Table 13). This evidence is consistent with the agency problem interpretation of our findings.

5. Conclusion

While pensions are an integral part of executive compensation, they had received little attention until recently. Sundaram and Yermack (2007) are the first in the literature to link pension values to the cash components of direct annual compensation, and this paper is the first to document the feedback effect of pensions on executive annual compensation and actuarial assumptions of DB plans. Under the disguise of the complexity of pension arrangement, firms with weak governance boost annual bonuses in anticipation of plan freezes and executive retirement and lower plan discount rates when executives are eligible to retire and take lump-sum payouts.

[38] In untabulated tests, we examine the effect of (ex-post) executive retirement on plan discount rates when a lump-sum distribution of benefits is permitted and reach the same conclusion. We find that the extent of discount rate manipulation for SERPs is noticeably greater than that for qualified plans. The results on discount rate manipulation at ex-post retirement are slightly weaker than those reported in Table 11 and stronger than those reported in Table 12.

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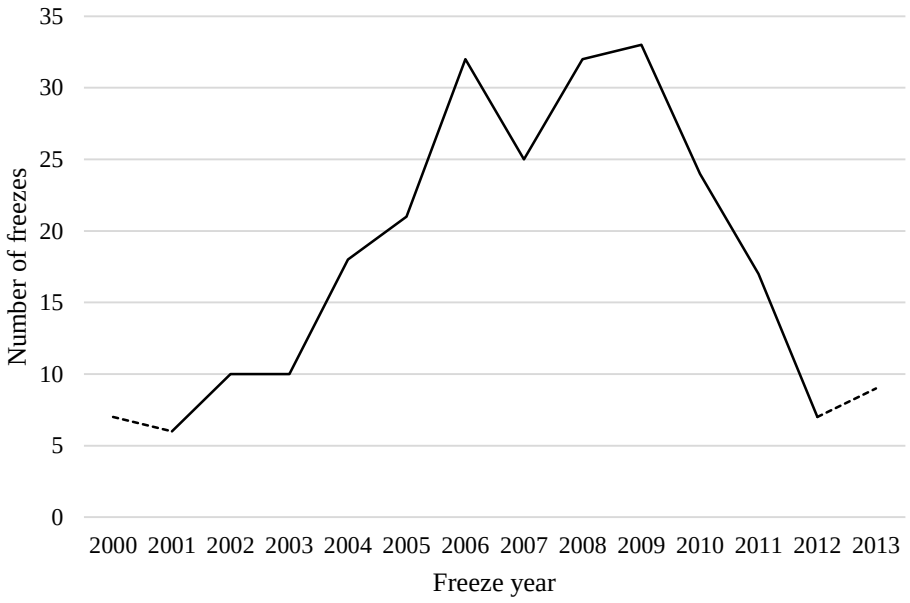
Figure 1: Distribution of Defined Benefit (DB) Plan Freezes

Panel A depicts the number of *hard freezes* of DB plans over the period from 2000 to 2013. The dashed lines reflect potentially incomplete observations. Plan administrators are required to report plans that are *hard frozen* in Form 5500 filings after 2002. However, these disclosures often have a delay of over two years. The distribution of hard freezes shown in the figure is extracted by reading plan descriptions from the attachments to Form 5500, as plan administrators often disclose the *hard freeze* with an additional delay. Panel B reports the distribution of firms that froze their DB plans by industry.

Panel A. Distribution of DB plan freezes by year



Panel B. Distribution of firms that froze DB plans by industry

Industry	No. of firms that froze DB plans	No. of firms in the sample	Percentage
Consumer Durables	12	41	29.27
Other	27	94	28.72
Shops	18	78	23.08
Manufacturing	47	213	22.07
Business Equipment	16	77	20.78
Money	37	191	19.37
Health	8	49	16.33
Telecommunication	6	38	15.79
Chemicals and Allied Products	9	60	15.00
Energy	7	53	13.21
Consumer Nondurables	13	103	12.62
Utilities	7	87	8.05

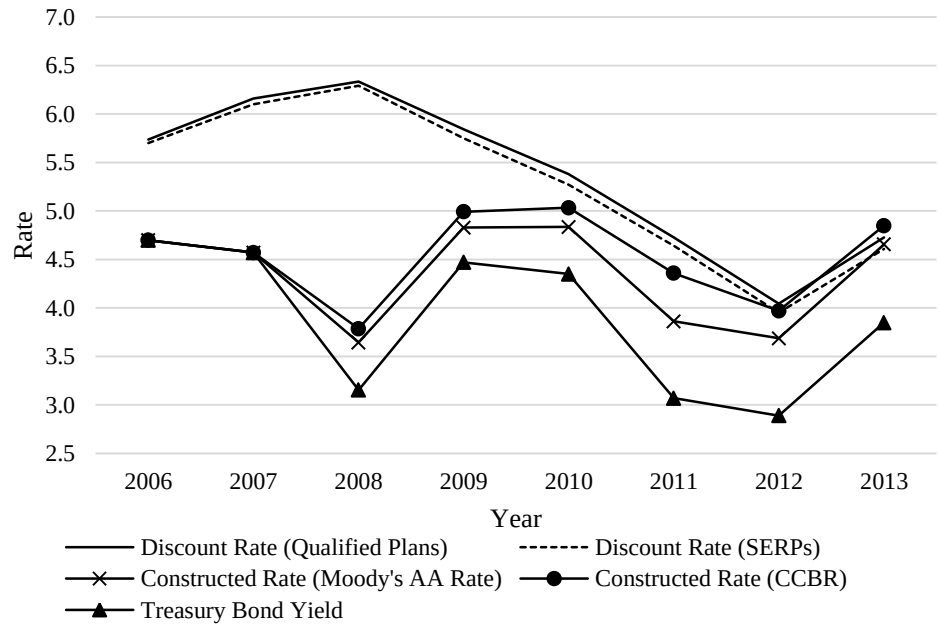
Figure 2: Distribution of Executive Retirement

This figure depicts the distribution of *Retirement* over the period from 2006 to 2013. *Retirement* is set to 1 if any top executive of a firm meets the retirement condition at which 100% of pension benefits can be paid out in a fiscal year under the specification of qualified plans and SERPs, respectively.

Figure 3: Plan Discount Rates versus Benchmark Rates

This figure depicts the comparison of average plan discount rates with benchmark rates during 2006–2013. In Panel A, we use the constructed rates as benchmark rates, which is a weighted-average rate using each of two high-quality bond rates (*Moody's AA Rate and CCBR*) and the 30-year Treasury bond yield based on the transition schedule given in PPA 2006. The trend of the Treasury bond yield is also depicted in Panel A. In Panel B, we use *Moody's AA Rate and CCBR* as benchmark rates.

Panel A. Plan discount rates versus constructed rates and Treasury bond yield



Panel B. Plan discount rates versus high-quality bond rates

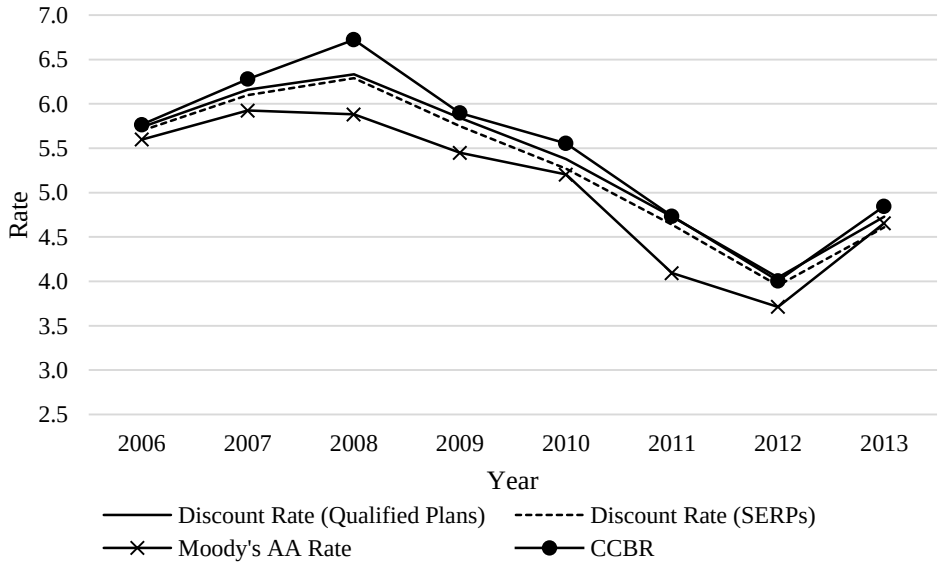


Table 1: Summary Statistics

Pre Freeze is a dummy variable equal to 1 if the firm freezes its DB pension plan in the next fiscal year and 0 otherwise. *Bonus*, *Equity*, and *Salary* are executive compensation variables (in thousands of dollars) extracted from ExecuComp at the executive level. To handle cases when *Bonus*, *Equity*, and *Salary* are equal to 0, we calculate and report the natural logarithmic transformation of (1 + *Bonus*), (1 + *Equity*), and (1 + *Salary*), respectively. *Sales (ln) lag* is the natural logarithmic transformation of lagged *Sales*. *ROA* is the ratio of EBIT to total assets. *Negative Income* equals 1 if the firm's net income is negative and 0 otherwise. *Income Increase* equals 1 if the firm's net income increases from last year and 0 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 SIC industry, while firm cash flow volatility is the standard deviation of a firm's cash flow (scaled by total assets) in the previous 10 years. *Funding%* is the ratio of the company's overall pension assets to pension obligations (Compustat items: *PPLAO*/*PBPRO*), and *Underfunded* is a dummy variable that equals 1 if *Funding%* is less than 100% and 0 otherwise. *Relative Pension Size* is the ratio of the projected pension benefit obligation to total assets. *Unionized* equals 1 if all DB plans of a firm are unionized and 0 otherwise.

	Pre Freeze = 1			Pre Freeze = 0			Mean	*t*-test	Median	Median Test
	N	Mean	Median	*N*	Mean	Median	Diff	*p*-value	Diff	*p*-value
Bonus (ln)	1,505	5.201	5.860	60,326	5.049	5.628	0.153	0.011	0.232	0.000
Equity (ln)	1,472	5.441	6.278	59,100	5.382	6.218	0.059	0.433	0.060	0.267
Salary (ln)	1,505	6.099	6.111	60,326	6.021	6.014	0.078	0.000	0.097	0.000
Sales (ln) lag	1,505	8.369	8.264	60,326	8.011	7.896	0.358	0.000	0.368	0.000
ROA	1,505	0.070	0.064	60,326	0.085	0.076	-0.015	0.000	-0.012	0.000
ROA lag	1,505	0.074	0.066	60,326	0.087	0.078	-0.013	0.000	-0.012	0.001
Negative Income	1,505	0.202	0.000	60,326	0.146	0.000	0.056	0.000	0.000	0.000
Income Increase	1,505	0.542	1.000	60,326	0.600	1.000	-0.057	0.000	0.000	.
Return	1,505	0.051	0.032	60,326	0.103	0.084	-0.052	0.000	-0.052	0.001
Return lag	1,505	0.080	0.027	60,326	0.100	0.071	-0.020	0.054	-0.044	0.000
Return Volatility	1,505	0.110	0.088	60,326	0.100	0.087	0.009	0.000	0.000	0.810
M/B	1,505	2.297	1.884	60,326	2.618	1.917	-0.321	0.000	-0.034	0.588
Leverage	1,505	0.260	0.235	60,326	0.265	0.254	-0.005	0.208	-0.019	0.000
Total Assets (ln) lag	1,505	8.784	8.573	60,326	8.456	8.318	0.328	0.000	0.255	0.000
Cash Flow Volatility	1,505	0.039	0.036	60,326	0.037	0.036	0.002	0.001	0.001	0.035
Underfunded	1,505	0.832	1.000	59,854	0.785	1.000	0.047	0.029	0.000	.
Funding%	1,505	0.830	0.819	59,854	0.855	0.823	-0.025	0.000	-0.004	0.420
Relative Pension Size	1,505	0.201	0.124	60,326	0.156	0.099	0.045	0.000	0.025	0.007
Unionized	1,425	0.084	0.000	54,544	0.144	0.000	-0.060	0.000	0.000	0.000

Table 2: Executive Annual Bonuses before Plan Freezes

This table reports the results of regressing executive bonuses on a forthcoming pension plan freeze and other firm and executive characteristics. We estimate the following OLS regression:

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

Pre Freeze is 1 if the firm is freezing its pension plans the following fiscal year and 0 otherwise. Because there are cases of zero salary and bonus payouts, we add 1 (in thousands of dollars) and take the natural logarithmic transformation of (1 + *Bonus*) and (1 + *Salary*). The remaining variables are defined in Appendix A. Columns 1 and 2 report the regression results for all firms with DB pensions while 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% levels, respectively.

	All Firms with Defined Benefit Pension Plans		Firms that Froze Defined Benefit Pension Plans	
Dependent variable: Bonus (ln)	(1)	(2)	(3)	(4)
Pre Freeze	0.185**	0.239***	0.231**	0.293***
	(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	0.263***	0.053	0.258***	-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	-0.502***	-0.434***	-0.522***	-0.395***
	(0.076)	(0.074)	(0.137)	(0.133)
Income Increase	0.356***	0.416***	0.240***	0.327***
	(0.040)	(0.038)	(0.091)	(0.081)
Return	0.961***	0.840***	1.002***	0.811***
	(0.057)	(0.052)	(0.116)	(0.102)
Return lag	0.401***	0.327***	0.487***	0.337***
	(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	-0.025***	0.000	-0.033**
	(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 Dummy	-0.014	0.021	-0.222**	-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
Observations	61,831	61,831	16,845	16,845
Adjusted R-squared	0.368	0.448	0.433	0.440

Table 3: Propensity Score Matching (PSM) Model

This table reports the results of a propensity PSM model for firms that choose to freeze pensions versus firms that do not. Matching is done within the same two-digit 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 DB plan based on various firm-level characteristics. Taking into accounting that factors that affect plan freeze decisions may 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 treatment 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. We report the distribution of propensity scores for treatment and control firms in Panel C, the univariate comparisons between treatment and control groups on the mean and median of independent variables in the first-stage regression in Panel D, and those of bonuses in Panel E. All variables are described in Appendix A. Standard errors in parentheses are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: First-stage probit model

Dependent variable:	2000–2007	2008–2013
Pre Freeze	(1)	(2)
Total Assets (ln) lag	0.077***	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	-0.026*	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	0.510**	0.419**
	(0.203)	(0.204)
Constant	-3.115***	-2.755***
	(0.869)	(0.978)
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Observations	5,560	3,867
Pseudo R-squared	0.092	0.074

Panel B: Second-stage OLS regression

Dependent variable:	2000–2013	
Bonus (ln)	(1)	(2)
Pre Freeze	0.334**	0.331**
	(0.153)	(0.140)
Salary (ln)	1.323***	1.323***
	(0.174)	(0.162)
Sales (ln) lag	0.201***	0.299***
	(0.074)	(0.085)
ROA	6.082*	4.356
	(3.180)	(3.210)
ROA lag	-1.430	1.131
	(3.059)	(3.226)
Negative Income	-0.642*	-0.138
	(0.351)	(0.404)
Income Increase	0.498**	0.569**
	(0.215)	(0.230)
Return	0.954***	0.684**
	(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 Dummy	-0.283*	-0.291**
	(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	No	Yes
Observations	2,429	2,429
Adjusted R-squared	0.377	0.467

Table 3 (continued)

Panel C: Estimated propensity score distributions

Propensity Scores	*N*	*p*1	*p*5	Median	*p*95	*p*99	Mean	S.D.
Treatment	205	0.005	0.009	0.036	0.106	0.125	0.042	0.030
Control	205	0.005	0.009	0.036	0.105	0.130	0.042	0.030
Difference	.	0.000	0.000	0.000	0.000	-0.005	0.000	0.000

Panel D: Differences in first-stage regression variables between treatment and control firms

	Treatment			Control			Mean	*t*-test	Median	Median Test
	N	Mean	Median	*N*	Mean	Median	Diff	*p*-value	Diff	*p*-value
Total Assets (ln) lag	205	8.795	8.621	205	8.853	8.605	-0.058	0.746	0.016	0.921
ROA	205	0.072	0.069	205	0.075	0.070	-0.003	0.636	-0.001	0.921
ROA lag	205	0.077	0.073	205	0.077	0.067	0.000	0.973	0.006	0.489
Return	205	0.058	0.044	205	0.062	0.091	-0.004	0.926	-0.047	0.489
Return lag	205	0.069	0.032	205	0.112	0.091	-0.043	0.256	-0.059	0.093
M/B	205	2.215	1.848	205	2.315	1.824	-0.100	0.690	0.024	0.921
Leverage	205	0.248	0.226	205	0.242	0.213	0.006	0.694	0.013	0.277
Cash Flow Volatility	205	0.038	0.037	205	0.038	0.037	0.000	1.000	0.000	1.000
Underfunded	205	0.834	1.000	205	0.883	1.000	-0.049	0.157	0.000	.
Funding%	205	0.836	0.827	205	0.823	0.817	0.013	0.541	0.010	0.489
Relative Pension Size	205	0.176	0.099	205	0.171	0.108	0.005	0.786	-0.009	0.767

Panel E: Differences in bonuses between executives at treatment and control firms

	Treatment			Control			Mean	*t*-test	Median	Median Test
	N	Mean	Median	*N*	Mean	Median	Diff	*p*-value	Diff	*p*-value
Bonus (ln)	1,232	5.252	5.837	1,197	5.004	5.740	0.248	0.012	0.097	0.216

Table 4: Equity Awards and Plan Freezes

This table reports the results of regressing executive equity awards on a forthcoming pension plan freeze and other firm and executive characteristics. We estimate the following OLS regression:

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

The variable *Pre Freeze* is 1 in the current year if the firm is freezing its pension plans the following fiscal year and 0 otherwise. The remaining variables are defined in Appendix A. Columns 1 and 2 report the regression results for all firms with DB pensions while 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; 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% levels, respectively.

	All Firms with Defined Benefit Pension Plans		Firms that Froze Defined Benefit Pension Plans	
Dependent variable: Equity (ln)	(1)	(2)	(3)	(4)
Pre Freeze	-0.183	-0.149	-0.220*	-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	0.369***	0.210***	0.399***	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	0.283*	0.149
	(0.075)	(0.065)	(0.160)	(0.114)
Income Increase	0.029	0.046	0.145*	0.154**
	(0.043)	(0.038)	(0.086)	(0.072)
Return	0.120*	0.162***	0.250**	0.207**
	(0.065)	(0.056)	(0.121)	(0.095)
Return lag	0.088	0.186***	0.168	0.234**
	(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	0.034***	0.020**	0.017	0.017
	(0.010)	(0.009)	(0.017)	(0.011)
Leverage	-0.327	-0.466	-0.878*	-0.509
	(0.247)	(0.330)	(0.480)	(0.548)
CEO Dummy	0.408***	0.325***	0.532***	0.490***
	(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
Observations	60,572	60,572	16,526	16,526
Adjusted R-squared	0.286	0.393	0.304	0.359

Table 5: Channels for Boosting Pensionable Earnings before Plan Freezes

This table reports the results of examining different approaches for boosting pensionable earnings. In column 1, we regress executive salary on a forthcoming plan pension freeze and other firm and executive characteristics. We estimate the following OLS regression:

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

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, while those in columns 2 through 4 are over the subsample starting from December 15, 2006, when data on discretionary bonuses (Compustat item: *BONUS*) are available. *Pre Freeze* is 1 if the firm is freezing its pension plans the following fiscal year and 0 otherwise. Because there are cases of zero bonus and salary payouts, we add 1 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 Appendix A. 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% levels, respectively.

	Entire Sample	Subsample Starting on December 15, 2006		
Dependent variable:	(1) Salary (ln)	(2) Bonus (ln)	(3) Non-equity Incentive (ln)	(4) Discretionary Bonus (ln)
Pre Freeze	-0.003	0.354***	0.086	0.459***
	(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	0.165***	-0.010	-0.446	0.539*
	(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	-0.307***	-3.662**	-6.030***	1.199
	(0.116)	(1.602)	(2.037)	(1.534)
Negative Income	-0.012	-0.539***	-0.524**	-0.064
	(0.013)	(0.193)	(0.220)	(0.170)
Income Increase	0.013	0.161	0.237*	-0.142
	(0.008)	(0.113)	(0.131)	(0.105)
Return	0.016	0.805***	0.781***	0.265**
	(0.010)	(0.145)	(0.167)	(0.126)
Return lag	0.033***	0.399***	0.335**	0.190
	(0.010)	(0.134)	(0.146)	(0.123)
Return Volatility	-0.222**	-4.715***	-6.946***	0.533
	(0.111)	(1.495)	(1.696)	(1.407)
M/B	-0.001	-0.044*	-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 Dummy	0.735***	-0.088	-0.010	-0.254***
	(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
Observations	16,845	7,531	7,531	7,531
Adjusted R-squared	0.592	0.496	0.549	0.451

Table 6: Annual Bonuses before Plan Freezes: Effect of Governance

This table reports the results of regressing executive bonuses on a forthcoming plan freeze, the strength of governance, their interaction term, and other firm and executive characteristics. We estimate the following OLS regression:

$$Bonus_{ijt} = \alpha + \beta_1 \times Pre\ Freeze_{it} + \beta_2 \times Pre\ Freeze_{it} \times Strong\ Governance_{it} + \beta_3 \times Strong\ Governance_{it} + \gamma_1 \times Salary_{ijt} + \gamma_2 \times X_{i,t\ or\ t-1} + \eta_t + \mu_i + \varepsilon_{ijt}.$$

Pre Freeze is 1 if the firm is freezing its pension plans the following fiscal year and 0 otherwise. *Strong Governance* is 1 if the governance index is greater than 4 (the top quintile). The remaining variables are defined in Appendix A. Columns 1 and 2 report the regression results for all firms with DB pensions, while columns 3 and 4 restrict the sample to firms that implemented pension freezes during our sample period. We include industry-year fixed effects in columns 1 and 3, and 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% levels, respectively.

	All Firms with Defined Benefit Pension Plans		Firms that Froze Defined Benefit Pension Plans	
Dependent variable: Bonus (ln)	(1)	(2)	(3)	(4)
Pre Freeze	0.371***	0.425***	0.428***	0.459***
	(0.117)	(0.104)	(0.144)	(0.106)
Pre Freeze × Strong Governance	-0.826***	-0.679**	-0.831***	-0.649**
	(0.319)	(0.278)	(0.316)	(0.283)
Strong Governance	0.005	-0.064	-0.089	-0.070
	(0.069)	(0.062)	(0.149)	(0.118)
Salary (ln)	1.110***	1.064***	1.254***	1.097***
	(0.067)	(0.061)	(0.121)	(0.130)
Sales (ln) lag	0.279***	-0.040	0.250***	-0.291
	(0.031)	(0.108)	(0.058)	(0.181)
ROA	6.932***	8.615***	8.459***	10.857***
	(0.738)	(0.835)	(1.458)	(1.316)
ROA lag	-4.355***	-3.160***	-6.664***	-4.601***
	(0.722)	(0.731)	(1.446)	(1.161)
Negative Income	-0.489***	-0.457***	-0.457***	-0.371**
	(0.096)	(0.096)	(0.155)	(0.156)
Income Increase	0.339***	0.410***	0.175	0.300***
	(0.048)	(0.047)	(0.116)	(0.102)
Return	1.022***	0.862***	1.190***	0.926***
	(0.072)	(0.066)	(0.150)	(0.126)
Return lag	0.466***	0.388***	0.569***	0.465***
	(0.058)	(0.059)	(0.116)	(0.115)
Return Volatility	-3.302***	-4.602***	-4.904***	-4.987***
	(0.678)	(0.713)	(1.382)	(1.467)
M/B	-0.009	-0.029***	-0.005	-0.038**
	(0.009)	(0.009)	(0.016)	(0.016)
Leverage	0.258	-0.178	0.168	0.219
	(0.230)	(0.294)	(0.551)	(0.667)
CEO Dummy	0.051	0.077	-0.124	-0.007
	(0.055)	(0.050)	(0.101)	(0.105)
Constant	-4.052***	-1.429*	-4.398***	0.642
	(0.383)	(0.842)	(0.647)	(1.493)
Industry-Year Fixed Effects	Yes	No	Yes	No
Year Fixed Effects	No	Yes	No	Yes
Firm Fixed Effects	No	Yes	No	Yes
Observations	43,757	43,757	11,382	11,382
Adjusted R-squared	0.378	0.461	0.450	0.447

Table 7: Executive Annual Bonuses before Plan Freezes: Incentive Provisions for Managerial Effort

This table reports the results of regressing executive bonuses on an impending pension plan freeze, *Pre Freeze*, and its interaction term 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 following OLS regression:

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

In columns 2 and 3, we use *Relative Pension Size* and *Unionized* to replace *Underfunded*, respectively. *Pre Freeze* is 1 if the firm is freezing its pension plans the following fiscal year and 0 otherwise. *Underfunded* is 1 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 1 if all DB plans of the firm are unionized and 0 otherwise. Because there are cases of zero bonus and salary payouts, we add 1 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 Appendix A. 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% levels, respectively.

Table 7 (continued)

Dependent variable: Bonus (ln)	(1)	(2)	(3)
Pre Freeze	0.433*	0.292**	0.256***
	(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)
Sales (ln) lag	-0.181	-0.178	-0.069
	(0.125)	(0.139)	(0.132)
ROA	12.282***	12.251***	12.073***
	(1.251)	(1.235)	(1.306)
ROA lag	-5.660***	-5.618***	-6.143***
	(1.051)	(1.055)	(1.133)
Negative Income	-0.392***	-0.394***	-0.445***
	(0.133)	(0.134)	(0.139)
Income Increase	0.322***	0.326***	0.315***
	(0.081)	(0.081)	(0.085)
Return	0.813***	0.810***	0.782***
	(0.103)	(0.103)	(0.104)
Return lag	0.338***	0.337***	0.321***
	(0.093)	(0.093)	(0.096)
Return Volatility	-5.195***	-5.031***	-5.561***
	(1.099)	(1.123)	(1.144)
M/B	-0.034**	-0.033**	-0.034***
	(0.013)	(0.013)	(0.013)
Leverage	-0.568	-0.571	-0.677
	(0.536)	(0.543)	(0.568)
CEO Dummy	-0.071	-0.066	-0.081
	(0.093)	(0.093)	(0.089)
Constant	0.105	0.032	-0.722
	(1.041)	(1.186)	(1.118)
Year Fixed Effects	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Observations	16,737	16,845	15,815
Adjusted R-squared	0.441	0.440	0.446

Table 8: Executive Annual Bonuses before Plan Freezes: Incentive Provisions for Retention Purpose

This table reports the results of examining incentive provisions for retention purposes under optimal contracting. In Panel A, we report the summary statistics of the four market competitiveness measures: *Outside CEOs*, *Co-movement*, *HHI* and *Fluidity*. *Outside CEOs* is the fraction of outsider new CEOs 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 CRSP firms within two-digit 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 (Hoberg, Phillips, and Prabhala, 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 and other firm and executive characteristics. In column 1, we estimate the following OLS regression:

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

In columns 2 through 4, we use *Co-movement*, *HHI* and *Fluidity* to replace *Outside CEOs*, respectively. *Pre Freeze* is 1 if the firm is freezing its pension plans the following fiscal year and 0 otherwise. Because there cases of zero bonus and salary payouts, we add 1 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 Appendix A. 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. Robust standard errors in parentheses are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Summary statistics on measures of market competitiveness

	N	Min	*p*25	Median	*p*75	Max	Mean	S.D.
Outside CEOs	16,683	0.000	0.200	0.277	0.350	1	0.287	0.119
Co-movement	14,084	0.369	0.641	0.813	0.902	1.089	0.734	0.200
HHI	16,845	0.008	0.045	0.067	0.119	0.533	0.096	0.080
Fluidity	16,279	0.000	3.605	5.253	7.768	32.326	6.221	3.841

Table 8 (continued)

Panel B: Multivariate analysis on incentive provisions for retention purpose

Dependent variable: Bonus (ln)	(1)	(2)	(3)	(4)
Pre Freeze	0.148	0.856***	0.310**	0.560***
	(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		-0.772**		
		(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				-0.045*
				(0.026)
Salary (ln)	1.189***	1.136***	1.089***	1.100***
	(0.107)	(0.121)	(0.107)	(0.103)
Sales (ln) lag	0.267***	0.288***	-0.182	-0.191
	(0.044)	(0.050)	(0.120)	(0.127)
ROA	10.266***	9.919***	12.190***	12.223***
	(1.178)	(1.298)	(1.238)	(1.233)
ROA lag	-6.803***	-6.367***	-5.667***	-5.716***
	(1.004)	(1.147)	(1.044)	(1.064)
Negative Income	-0.502***	-0.469***	-0.376***	-0.398***
	(0.144)	(0.162)	(0.132)	(0.135)
Income Increase	0.314***	0.293***	0.327***	0.308***
	(0.084)	(0.092)	(0.082)	(0.081)
Return	1.001***	1.013***	0.814***	0.779***
	(0.098)	(0.115)	(0.102)	(0.104)
Return lag	0.572***	0.612***	0.352***	0.307***
	(0.090)	(0.103)	(0.093)	(0.093)
Return Volatility	-4.791***	-5.361***	-4.989***	-4.860***
	(0.960)	(1.092)	(1.083)	(1.102)
M/B	-0.014	-0.017	-0.033**	-0.034***
	(0.014)	(0.016)	(0.013)	(0.013)
Leverage	0.424	0.397	-0.694	-0.642
	(0.336)	(0.371)	(0.517)	(0.541)
CEO Dummy	-0.134	-0.077	-0.068	-0.067
	(0.092)	(0.103)	(0.093)	(0.089)
Constant	-4.445***	-4.477***	0.456	0.332
	(0.536)	(0.590)	(1.047)	(1.060)
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	No	No	Yes	Yes
Observations	16,683	14,084	16,845	16,279
Adjusted R-squared	0.342	0.337	0.442	0.448

Table 9: Annual Bonuses before Executive Retirement

This table reports the results of regressing executive bonuses on a forthcoming retirement, and other firm and executive characteristics. We estimate the following OLS regression:

$$Bonus_{ijt} = \alpha + \beta_1 \times Pre\ Depart_{ijt} + \beta_2 \times Pre\ Depart_{ijt} \times Age\#^{+}{}_{ijt} + \beta_3 \times Age\#^{+}{}_{ijt}$$

$$+ \gamma_1 \times Salary_{ijt} + \gamma_2 \times X_{i,t\ or\ t-1} + \eta_t + \mu_i + \varepsilon_{ijt}.$$

Pre Depart is 1 if the executive is departing the following fiscal year and 0 otherwise, as recorded in ExecuComp (ExecuComp items: *LEFTCO*, *RELEFT*, and *LEFTOFC*). *Age#*$^{+}$ is 1 if the executive is approaching or exceeding the retirement age the following fiscal year and 0 otherwise. We use 60, 62, and 65 as proxies for retirement ages. Because ExecuComp stopped updating data on executive departure after 2009, our sample period is 2000–2008. All control variables are the same as in Table 2. We include year fixed effects and firm fixed effects. In Panel A, we use the sample of firms with DB pensions. In Panel B, we use the sample of all firms in ExecuComp that have available control variables. In Panel C, we compare the differences in coefficients on the interaction terms in Panel A and Panel B. Robust standard errors in parentheses are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Firms with DB pension plans

Dependent variable:	Bonus (ln)			Equity (ln)		
	(1)	(2)	(3)	(4)	(5)	(6)
Pre Depart	-0.412***	-0.412***	-0.323***	-0.196**	-0.217***	-0.289***
	(0.079)	(0.071)	(0.063)	(0.092)	(0.083)	(0.074)
Pre Depart × Age59^{+}	0.437***			-0.219		
	(0.109)			(0.138)		
Age59^{+}	-0.214***			-0.225***		
	(0.036)			(0.051)		
Pre Depart Age61^{+}		0.594***			-0.206	
		(0.111)			(0.153)	
Age61^{+}		-0.251***			-0.308***	
		(0.047)			(0.068)	
Pre Depart × Age64^{+}			0.591***			0.134
			(0.145)			(0.218)
Age64^{+}			-0.394***			-0.657***
			(0.079)			(0.121)
Salary (ln)	1.003***	0.998***	0.989***	1.634***	1.632***	1.628***
	(0.061)	(0.061)	(0.061)	(0.090)	(0.090)	(0.090)
Constant	-0.559	-0.521	-0.480	-5.512***	-5.488***	-5.495***
	(0.721)	(0.721)	(0.722)	(1.111)	(1.111)	(1.112)
Control Variables (as in Table 2)	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	30,951	30,951	30,951	30,492	30,492	30,492
Adjusted R-squared	0.504	0.504	0.504	0.395	0.396	0.396

Table 9 (continued)

Panel B: All ExecuComp Firms

Dependent variable:	Bonus (ln)			Equity (ln)		
	(1)	(2)	(3)	(4)	(5)	(6)
Pre Depart	-0.358***	-0.371***	-0.340***	-0.178***	-0.194***	-0.240***
	(0.048)	(0.046)	(0.042)	(0.059)	(0.056)	(0.052)
Pre Depart × Age59^{+}	0.250***			-0.129		
	(0.076)			(0.102)		
Age59^{+}	-0.225***			-0.390***		
	(0.028)			(0.040)		
Pre Depart × Age61^{+}		0.401***			-0.065	
		(0.083)			(0.114)	
Age61^{+}		-0.277***			-0.539***	
		(0.036)			(0.053)	
Pre Depart × Age64^{+}			0.501***			0.221
			(0.110)			(0.160)
Age64^{+}			-0.446***			-0.875***
			(0.059)			(0.082)
Salary (ln)	0.958***	0.955***	0.950***	1.450***	1.448***	1.439***
	(0.039)	(0.039)	(0.039)	(0.051)	(0.051)	(0.051)
Constant	-1.385***	-1.374***	-1.361***	-4.253***	-4.244***	-4.234***
	(0.403)	(0.403)	(0.403)	(0.557)	(0.557)	(0.558)
Control Variables (as in Table 2)	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	68,797	68,797	68,797	67,765	67,765	67,765
Adjusted R-squared	0.508	0.508	0.508	0.348	0.348	0.349

Panel C: Comparison of coefficients on interaction terms in Panel A and Panel B

Panel A – Panel B	0.187	0.193	0.090	-0.090	-0.141	-0.087
p-value	0.018	0.017	0.380	0.375	0.189	0.560

Table 10: Univariate Analysis on Discount Rate and Executive Retirement

Discount rate (*r*) is the rate used to calculate the present value of pension benefits under qualified plans and SERPs, respectively, as disclosed in firms' proxy statements or 10-K filings. *Retirement* is set to 1 if any top executive of a firm meets the retirement conditions in a fiscal year under qualified plans and SERPs, respectively. *Lump Sum* is a dummy variable equal to 1 if lump-sum distribution of pension benefits is permitted and 0 otherwise. Panel A describes discount rates of qualified plans and SERPs. Panel B reports the age distribution of firm years with retirement defined based only on age. Panels C and D report the univariate analysis on the discount rate in excess of the benchmark rate based on whether there is executive retirement and whether lump-sum distribution is permitted. In Panel C, we construct a weighted-average benchmark rate using each of two high-quality bond rates (*Moody's AA Rate and CCBR*) and the 30-year Treasury bond yield based on the transition schedule given in PPA 2006. In Panel D, we use *Moody's AA Rate and CCBR* as benchmark rates.

Panel A: Discount rate of qualified plans and SERPs

	Lump Sum = 1			Lump Sum = 0			Total		
Discount Rate	*N*	Mean	Median	*N*	Mean	Median	*N*	Mean	Median
Qualified Plans	3,277	5.369	5.500	1,862	5.477	5.750	5,139	5.408	5.600
SERPs	3,241	5.264	5.450	1,747	5.454	5.700	4,988	5.331	5.500

Panel B: Retirement age distribution of firm years with retirement conditional only on age

Age	*N*	*p*1	*p*10	*p*25	Median	*p*75	*p*99	Mean	S.D.
Qualified Plans	4,263	55	62	62	65	65	65	63.93	1.89
SERPs	4,026	55	60	62	65	65	65	63.47	2.33

Panel C: Univariate analysis on the plan discount rate in excess of the constructed benchmark rate

		Lump Sum = 1			Lump Sum = 0			Mean	*t*-test	Median	Median Test
Retirement = 1		*N*	Mean	Median	*N*	Mean	Median	Diff	*p*-value	Diff	*p*-value
Qualified Plans	r − Moody's AA Rate	1,087	0.923	0.885	586	1.112	1.068	-0.189	0.000	-0.182	0.001
	r − CCBR	1,087	0.743	0.640	586	0.939	0.871	-0.196	0.000	-0.231	0.001
SERPs	r − Moody's AA Rate	1,222	0.830	0.797	628	1.109	1.068	-0.279	0.000	-0.271	0.000
	r − CCBR	1,222	0.647	0.533	628	0.940	0.903	-0.293	0.000	-0.370	0.000
Retirement = 0											
Qualified Plans	r − Moody's AA Rate	2,190	1.077	0.930	1,276	1.135	1.053	-0.058	0.082	-0.124	0.002
	r − CCBR	2,190	0.890	0.699	1,276	0.956	0.818	-0.066	0.060	-0.118	0.003
SERPs	r − Moody's AA Rate	2,019	0.973	0.870	1,119	1.100	1.028	-0.127	0.001	-0.158	0.000
	r − CCBR	2,019	0.787	0.611	1,119	0.921	0.773	-0.134	0.001	-0.162	0.000

Table 10 (continued)

Panel D: Univariate analysis on the plan discount rate in excess of the corporate bond rate

		Lump Sum = 1			Lump Sum = 0			Mean	*t*-test	Median	Median Test
Retirement = 1		*N*	Mean	Median	*N*	Mean	Median	Diff	*p*-value	Diff	*p*-value
Qualified Plans	r − Moody's AA Rate	1,087	0.220	0.300	586	0.387	0.360	-0.167	0.000	-0.060	0.000
	r − CCBR	1,087	-0.176	-0.070	586	-0.008	0.015	-0.168	0.000	-0.085	0.000
SERPs	r − Moody's AA Rate	1,222	0.126	0.220	628	0.362	0.340	-0.237	0.000	-0.120	0.000
	r − CCBR	1,222	-0.276	-0.130	628	-0.034	0.000	-0.242	0.000	-0.130	0.000
Retirement = 0											
Qualified Plans	r − Moody's AA Rate	2,190	0.310	0.320	1,276	0.349	0.360	-0.039	0.040	-0.040	0.000
	r − CCBR	2,190	-0.120	-0.080	1,276	-0.084	-0.020	-0.036	0.049	-0.060	0.000
SERPs	r − Moody's AA Rate	2,019	0.203	0.290	1,119	0.314	0.340	-0.111	0.000	-0.050	0.000
	r − CCBR	2,019	-0.228	-0.130	1,119	-0.118	-0.045	-0.110	0.000	-0.085	0.000

Table 11: Discount Rate and Executive Retirement

This table reports the results of regressing the discount rate in excess of the benchmark rate on *Lump Sum*, *Retirement*, and their interaction term. We estimate the following OLS regression:

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

Retirement is set to 1 if any top executive of the firm meets the retirement condition in a fiscal year under qualified plans and SERPs, respectively. *Lump sum* is 1 if lump-sum distribution of pension benefits is permitted and 0 otherwise. *Discount rate* (*r*) is the rate used to calculate the present value of pension benefits under qualified plans and SERPs, respectively. In Panel A, we construct a weighted-average benchmark rate using each of two high-quality bond rates (*Moody's AA Rate and CCBR*) and the 30-year Treasury bond yield based on the transition schedule given in PPA 2006. In Panel B, we use *Moody's AA Rate* and *CCBR* as benchmark rates. Columns 1 and 2 report regressions under qualified plans, while columns 3 and 4 report regressions under 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% levels, respectively.

Panel A: Plan discount rate in excess of the constructed benchmark rate

	Qualified Plans		SERPs	
	(1)	(2)	(3)	(4)
	r − Moody's AA Rate	r − CCBR	r − Moody's AA Rate	r − CCBR
Lump Sum	-0.037	-0.042	-0.109***	-0.114***
	(0.031)	(0.031)	(0.038)	(0.038)
Lump Sum × Retirement	-0.141***	-0.139***	-0.140***	-0.139***
	(0.046)	(0.046)	(0.053)	(0.054)
Retirement	0.066**	0.064**	0.069**	0.068**
	(0.030)	(0.031)	(0.030)	(0.030)
Constant	1.076***	1.080***	1.081***	1.084***
	(0.028)	(0.028)	(0.030)	(0.030)
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	5,139	5,139	4,988	4,988
Adjusted R-squared	0.691	0.724	0.623	0.660

Panel B: Plan discount rate in excess of the corporate bond rate

	Qualified Plans		SERPs	
	(1)	(2)	(3)	(4)
	r − Moody's AA Rate	r − CCBR	r − Moody's AA Rate	r − CCBR
Lump Sum	-0.037	-0.038	-0.110***	-0.111***
	(0.031)	(0.031)	(0.038)	(0.038)
Lump Sum × Retirement	-0.133***	-0.129***	-0.130**	-0.128**
	(0.045)	(0.045)	(0.053)	(0.053)
Retirement	0.061**	0.057*	0.067**	0.066**
	(0.029)	(0.029)	(0.029)	(0.029)
Constant	0.341***	-0.078***	0.308***	-0.112***
	(0.023)	(0.023)	(0.022)	(0.022)
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	5,139	5,139	4,988	4,988
Adjusted R-squared	0.110	0.064	0.091	0.051

Table 12: 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*, *Retirement*, and their interaction terms. We estimate the following OLS regression:

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

Retirement is set to 1 if any top executive of the firm meets the retirement condition in a fiscal year under qualified plans and SERPs, respectively. Among firms with retiring executives, we assign them into two groups based on the size of the retiring executives' pension benefits each year 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 fiscal year 2007, because 2006 is the first year when data on the present value of pension benefits are available. *Lump sum* is 1 if lump-sum distribution of pension benefits is permitted and 0 otherwise. *Discount rate* (*r*) is the rate used to calculate the present value of pension benefits under qualified plans and SERPs, respectively. In Panel A, we construct a weighted-average benchmark rate using each of two high-quality bond rates (*Moody's AA Rate and CCBR*) and the 30-year Treasury bond yield based on the transition schedule given in PPA 2006. In Panel B, we use *Moody's AA Rate and CCBR* as benchmark rates. Columns 1 and 2 report regressions under qualified plans, while columns 3 and 4 report regressions under 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% levels, respectively.

Table 12 (continued)

Panel A: Plan discount rate in excess of the constructed benchmark rate

	Qualified Plans		SERPs	
	(1)	(2)	(3)	(4)
	r − Moody's AA Rate	r − CCBR	r − Moody's AA Rate	r − CCBR
Lump Sum	-0.036	-0.041	-0.114***	-0.119***
	(0.033)	(0.033)	(0.040)	(0.040)
(a) Lump Sum × Group 1	-0.313***	-0.314***	-0.347***	-0.352***
	(0.121)	(0.120)	(0.122)	(0.123)
(b) Lump Sum × Group 2	-0.161***	-0.160***	-0.145**	-0.145**
	(0.057)	(0.058)	(0.064)	(0.064)
Group 1	0.191**	0.190**	0.256***	0.259***
	(0.085)	(0.083)	(0.091)	(0.092)
Group 2	0.089**	0.088**	0.076**	0.075**
	(0.037)	(0.038)	(0.035)	(0.035)
Constant	1.627***	1.631***	1.611***	1.614***
	(0.027)	(0.027)	(0.028)	(0.028)
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	4,331	4,331	4,183	4,183
Adjusted R-squared	0.712	0.742	0.643	0.677
p-value of test on H_0: (a) = (b)	0.228	0.219	0.091	0.086

Panel B: Plan discount rate in excess of the corporate bond rate

	Qualified Plans		SERPs	
	(1)	(2)	(3)	(4)
	r − Moody's AA Rate	r − CCBR	r − Moody's AA Rate	r − CCBR
Lump Sum	-0.036	-0.037	-0.115***	-0.116***
	(0.032)	(0.032)	(0.040)	(0.040)
(a) Lump Sum × Group 1	-0.333***	-0.330***	-0.348***	-0.330***
	(0.121)	(0.122)	(0.124)	(0.125)
(b) Lump Sum × Group 2	-0.145***	-0.137**	-0.125**	-0.122*
	(0.056)	(0.055)	(0.063)	(0.063)
Group 1	0.210**	0.208**	0.259***	0.241**
	(0.085)	(0.086)	(0.093)	(0.095)
Group 2	0.070**	0.058*	0.058*	0.051
	(0.036)	(0.035)	(0.034)	(0.034)
Constant	0.365***	-0.090***	0.331***	-0.124***
	(0.024)	(0.024)	(0.023)	(0.023)
Year Fixed Effects	Yes	Yes	Yes	Yes
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

Table 13: Discount Rate and Executive Retirement: Effect of Governance

This table reports the results of regressing the discount rate in excess of the benchmark rate on *Lump Sum*, *Retirement*, and their interaction terms. We estimate the following OLS regression:

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

Retirement is set to 1 if any top executive of the firm meets the retirement condition in a fiscal year under qualified plans and SERPs, respectively. *Lump sum* is 1 if lump-sum distribution of pension benefits is permitted and 0 otherwise. *Strong Governance* is 1 if the governance index is greater than 4 (the top quintile). *Discount rate* is the rate used to calculate the present value of pension benefits under qualified plans and SERPs, respectively. In Panel A, we construct a weighted-average benchmark rate using each of two high-quality bond rates (*Moody's AA Rate and CCBR*) and the 30-year Treasury bond yield based on the transition schedule given in PPA 2006. In Panel B, we use *Moody's AA Rate and CCBR* as benchmark rates. Columns 1 and 2 report regressions under qualified plans, while columns 3 and 4 report regressions under 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% levels, respectively.

Panel A: Plan discount rate in excess of the constructed benchmark rate, subsample of *Strong Governance* = 1

	Qualified Plans		SERPs	
	(1)	(2)	(3)	(4)
	r – Moody's AA Rate	r – CCBR	r – Moody's AA Rate	r – CCBR
Lump Sum	-0.027	-0.026	-0.032	-0.029
	(0.051)	(0.051)	(0.074)	(0.073)
Lump Sum × Retirement	-0.046	-0.054	-0.019	-0.024
	(0.115)	(0.116)	(0.117)	(0.115)
Retirement	0.108	0.108	0.019	0.016
	(0.094)	(0.095)	(0.068)	(0.066)
Constant	0.992***	0.993***	1.014***	1.015***
	(0.067)	(0.067)	(0.069)	(0.068)
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	696	696	659	659
Adjusted R-squared	0.717	0.746	0.664	0.698

Panel B: Plan discount rate in excess of the constructed benchmark rate, subsample of *Strong Governance* = 0

	Qualified Plans		SERPs	
	(1)	(2)	(3)	(4)
	r – Moody's AA Rate	r – CCBR	r – Moody's AA Rate	r – CCBR
Lump Sum	-0.054	-0.059	-0.163***	-0.167***
	(0.042)	(0.042)	(0.047)	(0.047)
Lump Sum × Retirement	-0.190***	-0.186***	-0.156**	-0.156**
	(0.056)	(0.057)	(0.061)	(0.061)
Retirement	0.085**	0.081**	0.077**	0.077**
	(0.037)	(0.037)	(0.037)	(0.037)
Constant	1.102***	1.106***	1.111***	1.113***
	(0.040)	(0.040)	(0.041)	(0.041)
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	2,991	2,991	2,973	2,973
Adjusted R-squared	0.676	0.709	0.620	0.655

Table 13 (continued)

Panel C: Plan discount rate in excess of the corporate bond rate, subsample of *Strong Governance* = 1

	Qualified Plans		SERPs	
	(1)	(2)	(3)	(4)
	r – Moody's AA Rate	r – CCBR	r – Moody's AA Rate	r – CCBR
Lump Sum	-0.034	-0.037	-0.034	-0.034
	(0.052)	(0.052)	(0.076)	(0.077)
Lump Sum × Retirement	-0.030	-0.031	-0.021	-0.033
	(0.112)	(0.112)	(0.115)	(0.113)
Retirement	0.097	0.099	0.035	0.044
	(0.090)	(0.091)	(0.063)	(0.059)
Constant	0.094	-0.074	0.106	-0.065
	(0.067)	(0.067)	(0.068)	(0.068)
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	696	696	659	659
Adjusted R-squared	0.126	0.024	0.106	0.013

Panel D: Plan discount rate in excess of the corporate bond rate, subsample of *Strong Governance* = 0

	Qualified Plans		SERPs	
	(1)	(2)	(3)	(4)
	r – Moody's AA Rate	r – CCBR	r – Moody's AA Rate	r – CCBR
Lump Sum	-0.049	-0.048	-0.162***	-0.162***
	(0.042)	(0.042)	(0.047)	(0.047)
Lump Sum × Retirement	-0.183***	-0.179***	-0.141**	-0.137**
	(0.056)	(0.056)	(0.061)	(0.061)
Retirement	0.076**	0.072**	0.066*	0.063*
	(0.036)	(0.036)	(0.037)	(0.037)
Constant	0.201***	0.032	0.211***	0.041
	(0.040)	(0.040)	(0.040)	(0.040)
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	2,991	2,991	2,973	2,973
Adjusted R-squared	0.111	0.090	0.099	0.075

Appendix A: Variable Definitions

Variable Name	Variable Definition
Age#$^{+}$	Dummy variable that equals 1 if the executive age is greater than or equal to # in {59, 61, 64}. For example, Age64^{+} equals 1 if the executive is at least 64 years old and 0 otherwise.
Board size	Number of directors serving on the board (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	The value of the two-digit SIC industry median of cash flow volatility, which is the standard deviation of cash flow (scaled by total firm assets) in the past 10 years. Cash flow is the sum of income before extraordinary items (Compustat item: *IB*) and depreciation and amortization (Compustat item: *DP*).
CCBR	The IRS' Composite Corporate Bond Rate.
CEO/Chairman Duality	Dummy variable that equals 1 if CEO is also chairman (ExecuComp items: *CEOANN*, *TITLEANN*).
Co-movement	A measure for the correlation between monthly stock returns between 1999 and 2012 of all 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)	The rate used to calculate the present value of pension benefits under qualified plans and 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 1 because equity values are 0 in many cases. The units are thousands of dollars.
HHI	A 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	A 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 is downloaded from Hoberg and Phillip's website, which is at the firm year level and is updated until 2013 (Hoberg, Phillips, and Prabhala, 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	Dummy variable that equals 1 if the firm's net income increases from last year and 0 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	Dummy variable that equals 1 if lump-sum distribution of pension benefits is permitted and 0 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*).

Appendix A (continued)

Negative Income	Dummy variable that equals 1 if the firm's net income is negative and 0 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).
Pension Value	The present value of each executive's pension benefits (ExecuComp item: *PENSION_VALUE*) under all plans scaled by salary (ExecuComp item: *SALARY*).
Pre Depart	Dummy variable that equals 1 if the executive is departing in the next fiscal year and 0 otherwise.
Pre Freeze	Dummy variable that equals 1 if the firm freezes its DB pension plan in the next fiscal year and 0 otherwise.
Relative Pension Size	Ratio of the projected pension benefit obligation (Compustat Item: *PBPRO*) to total assets (Compustat item: *AT*).
Retirement	Dummy variable that equals 1 if any top executive meets the retirement condition in a fiscal year under qualified plans and SERPs, respectively, and 0 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 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	Dummy variable that equals 1 if the governance index is greater than 4. The governance index is created as an equal-weighted index of seven indicators of governance measures (Board Size, CEO/Chairman Duality, % Busy Directors, % Co-opted Directors, % Independent Directors, Institutional Ownership, and Outside Directors' Ownership).
Total Assets	Ln (total assets) (Compustat item: *AT*).
Underfunded	Dummy variable that equals 1 if the firm's overall pension assets (Compustat Item: *PPLAO*) are lower than its pension obligations (Compustat item: *PBPRO*).
Unionized	Dummy variable that equals 1 if all DB plans of the firm are unionized and 0 otherwise.

Appendix B: Correlation Matrix

Pre Freeze equals 1 if the firm freezes its DB pension plan the following fiscal year and 0 otherwise. *Bonus*, *Equity*, and *Salary* are executive compensation variables (in thousands of dollars) extracted from ExecuComp at the executive level. To handle zero values of *Bonus*, *Equity*, and *Salary*, we use the natural logarithmic transformation of (1 + *Bonus*), (1 + *Equity*), and (1 + *Salary*). *Sales (ln) lag* is the natural logarithmic transformation of lagged *Sales*. *ROA* is the ratio of EBIT to total assets. *Negative Income* equals 1 if the firm's net income is negative and 0 otherwise. *Income Increase* equals 1 if the firm's net income increases from last year and 0 otherwise. *Return* is the stock return (including distribution and reinvestment) during the fiscal year. *Return Volatility* is the volatility of monthly stock returns over the 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 SIC industry; firm cash flow volatility is the standard deviation of a firm's cash flow in the previous 10 years. *Underfunded* is an indicator that equals 1 if the firm's pension assets are lower than that of its pension obligation and 0 otherwise. *Funding%* is the ratio of pension assets to obligations. *Relative Pension Size* is the ratio of the projected pension benefit obligation to total assets. *Unionized* equals 1 if all DB plans of the firm are unionized and 0 otherwise. Correlations with statistical significance better than 5% are printed in Times New Roman, and the remaining correlations in *italics*.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1) Pre Freeze	1																			
(2) Bonus (ln)	0.010	1																		
(3) Equity (ln)	*0.003*	0.310	1																	
(4) Salary (ln)	0.021	0.411	0.453	1																
(5) Sales (ln) lag	0.039	0.318	0.345	0.503	1															
(6) ROA	-0.036	0.238	0.119	0.075	0.049	1														
(7) ROA lag	-0.029	0.111	0.109	0.064	0.066	0.825	1													
(8) Negative Income	0.025	-0.273	-0.084	-0.063	-0.046	-0.395	-0.275	1												
(9) Income Increase	-0.018	0.232	0.037	0.029	-0.012	0.207	-0.028	-0.324	1											
(10) Return	-0.020	0.195	0.015	*-0.006*	-0.050	0.132	-0.013	-0.193	0.263	1										
(11) Return lag	*-0.008*	0.145	0.051	0.018	-0.031	0.240	0.126	-0.231	0.167	-0.105	1									
(12) Return Volatility	-0.012	-0.143	-0.104	-0.118	-0.162	-0.160	-0.162	0.272	-0.035	0.147	-0.024	1								
(13) M/B	-0.017	0.102	0.103	0.079	0.088	0.432	0.435	-0.151	0.068	-0.075	0.182	-0.116	1							
(14) Leverage	-0.011	-0.012	-0.041	*0.000*	0.091	-0.030	-0.053	0.104	-0.025	*-0.005*	-0.082	0.068	*0.007*	1						
(15) Total Assets (ln) lag	0.030	0.287	0.313	0.452	0.816	-0.197	-0.200	-0.059	*0.006*	-0.075	-0.054	-0.224	*0.004*	0.092	1					
(16) Cash Flow Volatility	0.014	0.016	0.057	0.026	-0.037	0.279	0.286	0.086	-0.029	0.043	0.028	0.209	0.095	-0.069	-0.306	1				
(17) Underfunded	0.018	0.036	0.038	0.069	*-0.003*	0.013	0.008	0.059	*-0.002*	0.039	0.028	0.042	-0.053	-0.039	-0.074	0.160	1			
(18) Funding%	-0.016	*0.003*	-0.021	-0.046	0.053	0.014	0.012	-0.110	0.031	*0.002*	*-0.004*	-0.089	0.074	0.042	0.127	-0.187	-0.760	1		
(19) Relative Pension Size	0.039	*-0.004*	0.018	0.019	0.058	0.091	0.079	0.085	-0.027	0.011	-0.010	0.057	0.064	-0.022	-0.153	0.274	0.038	0.025	1	
(20) Unionized	-0.027	-0.038	-0.028	-0.049	-0.046	0.015	0.013	*0.008*	-0.026	0.022	0.019	0.027	-0.040	0.079	-0.093	0.057	0.012	-0.028	0.042	1